AMERICAN
Gas Journal
THE MAGAZINE OF GAS DISTRIBUTION

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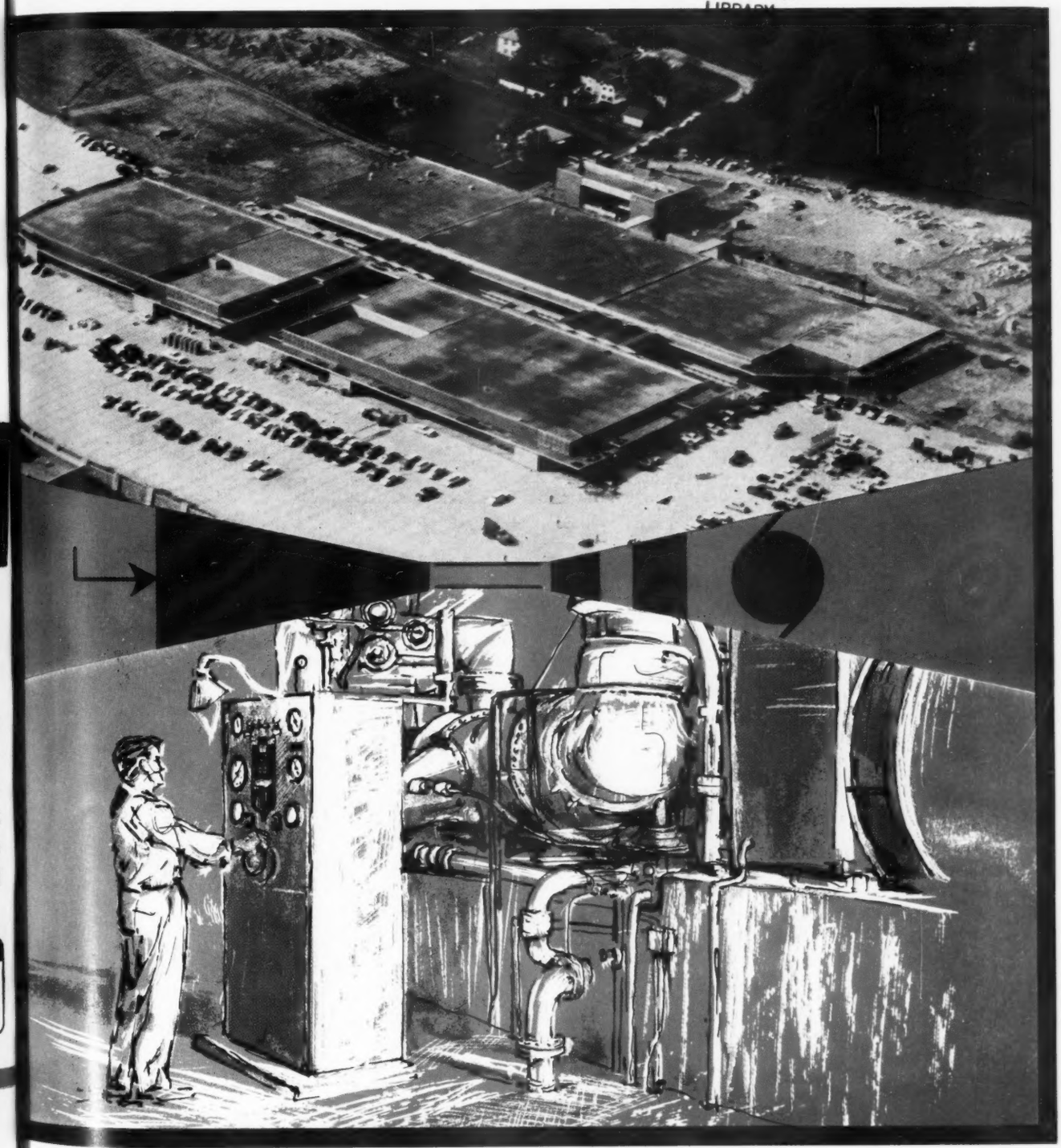
ENGINEERING

JUNE 1961



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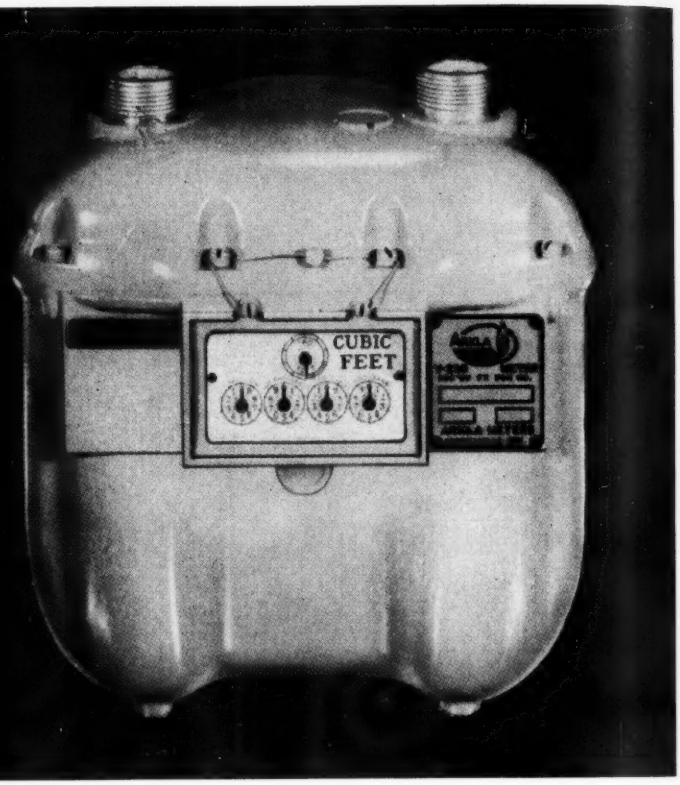
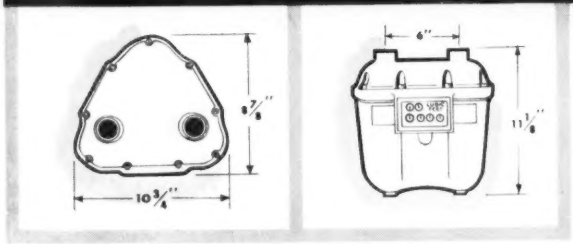
GAS METER





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American Gas Journal

THE MAGAZINE OF GAS DISTRIBUTION

VOLUME 188 **JUNE 1961** NUMBER 6

Load Building

Gas Picks Up Shopping Center's Total Energy Load 24

HEAT . . . cold . . . LIGHT . . . power . . . all from gas! Versatile gas turbine in Little Rock's new Park Plaza shopping center points out how economically and efficiently gas can provide all the modern energy needs.

Free — For your files, an extra copy of this article. Check No. 40 on reader service card.

Management & Operations

Central Hudson Turns to Telemetering/Analog Computing for Precise Gas Dispatching 30

To help solve complex supply-and-demand problems, New York utility turned to telemetering, computing, and control network. Achieved more economical dispatching, improved service through precise regulation of pressures, and reduced operating cost through supervised automation of remote regulator stations.

Service Renewals With Copper Tubing 27

Since 1946, Brooklyn Union Gas Co. has made some 31,000 service renewals using copper tubing, plans 11,000 more in 1961. Here's a story on how they do it . . . with details on the equipment they use.

Construction

Hydraulic Arm on Truck Speeds Pipe Laying 38

Unique rig designed by Arizona Public Service uses hydraulic "arm" to position pipe on dolly and lower it into trench. In rush job to supply fuel to irrigation pumping engines, rig helped APS install pipe in record time.

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News about planned and proposed construction in the gas distribution industry.

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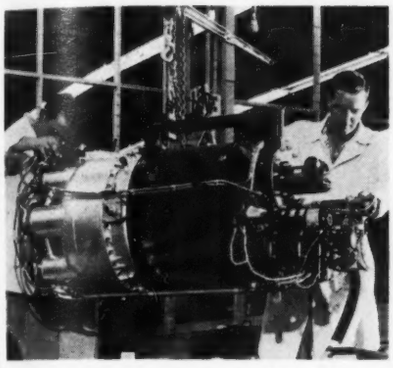
NEWS HILITES OF THE INDUSTRY



Small Gas Turbine, being assembled at AiResearch plant, is one of several types that will soon be competing with reciprocating engines as power source for air conditioning, heating, and refrigeration in industrial and commercial installations. AiResearch Manufacturing Co., subsidiary of Garrett Corp., Los Angeles, has joined Mission Manufacturing Co., Houston, to package, sell, and service small gas turbines for industrial applications. Recently Garrett took a big step forward toward true competition with reciprocating engines by introducing a 350-hp unit weighing only 450 lb, that has a fuel consumption of 0.45 lb/hp/hr,—fuel consumption approaching that of diesel engines and better than gasoline engines.

Gas Hair Dryers? Do they make 'em anymore? Possibly not, at least Lone Star Gas Co. researchers haven't been able to locate any manufacturers, *(we can't either, Ed.)* but they have found several beauty shops still using gas dryers installed about 25 years ago. Shops such as Neilson Beauty College in Dallas, Texas, indicate they not only have been satisfied with their gas hair dryers but have attempted to find some newer models. Loyalty to the gas-fired models stems from their quiet operation, drying hair from the scalp out, economy of operation, and customer-comments that they don't feel "baked" after being under a gas dryer. In the installation shown in the picture, dryers are of 3 types linked together in series to central ducts which convey heat from burner cabinets resembling a small central gas furnace.

A utility's right to keep industrial customers within its franchised area took another beating recently when state affairs committee of the Michigan House of Representatives killed a bill that would have required a utility to secure a favorable vote of citizens in a special election before it could enter a city already served by another utility. Seeking to protect its industrial gas market, in general, and its Ford Motor Co. business, specifically, from direct sales by Panhandle Eastern Pipe Line Co., Michigan Consolidated Gas Co. had sought this bill in an attempt to stop Panhandle from securing PUC permission to furnish gas to Ford's Rouge plant at Dearborn for 7 cents per Mcf below rate now charged by Mich-Con. Loss of Ford business Mich-Con. contends would force it to reduce rates to other industrial customers and result in higher rates for homeowners and small business in the Detroit area. However, the 15-year battle for control of the large Michigan industrial market is far from over. After killing the bill, state affairs committee introduced a resolution calling for special legislative committee to study industrial gas sales.

Thwarted, this year at least, in their underground aquifer storage plans at Brandywine, Md., Washington Gas Light Company is considering the possibilities of mined cavern storage of LPG to solve its immediate peak shaving problems. The company emphasized that the $3,000,000 cavern under consideration would not be a substitute for the aquifer storage which is still being delayed by a few landowners. *(Maryland General Assembly has refused this year to grant the utility condemnation powers to take over the geological dome site.)* In the new proposal, WGL would carve a 2-acre cavern out of solid rock for storage of liquid propane beneath part of the old Ravensworth tract on the Southern Railway lines between Springfield and the Ft. Belvoir reservoir. Excavation would be at a depth of 450 ft, and the cavern would have a capacity of 6,000,000 gal of LPG.

FPC Chairman Jerome K. Kuykendall, under fire recently because of what was termed the "incredible backlog" of cases pending FPC action, has released a report showing the status of 80 major natural gas construction applications — proposing some $838 million in new gas supply facilities — pending at the end of March. *(Some industry sources note report bears out that the backlog is actually "lowest in years," although filings are at an all-time high).* Certainly the report does show that nearly 20% of the total dollar cost proposed in the applications was being held up awaiting additional information from the applicants, delayed at the companies' request, or dependent on decisions in other cases. In addition, more than 17% of the dollar value, or $146,960,219 had already been authorized under temporary certificates in 29 cases.

Following President Kennedy's recommendations to revamp the Federal Power Commission, a whole rash of bills have been introduced in the Congress supporting one or several of the President's recommendations. Bill to exempt producers of less than 2 million Mcf of natural gas per year from regulation under the Natural Gas Act has been introduced by Reps. Macdonald (Mass.), Moss (Calif.) and Dingell (Mich.), who note the bill would greatly reduce workload of FPC as it would exempt 97% of the independent producers who presently supply gas to natural gas companies, yet retain jurisdiction over some 272 producers who supply better than 90% of the gas sold in interstate commerce. On a second front, Senator Albert Gore (D-Tenn.) has launched a bill to curb natural gas pipeline companies from putting additional rate increases into effect if they have an earlier increase still awaiting decision by the FPC. This bill goes beyond recommendation of President Kennedy who proposed that proceeds from unapproved increases simply be deposited in escrow pending final decisions by the commission. Possibly most virile of the crop of newborn bills is the so-called "NARUC" bill S. 666 sponsored by the National Association of Railroad and Utility Commissioners. Up for hearing May 24-25, the bill seeks to outlaw indefinite pricing clauses in independent producers' gas purchase contracts; let FPC suspend proposed rate changes of gas for resale for industrial use only and prohibit a proposed rate increase going into effect while a prior increase awaits FPC's disposition — something, if successful, the State Commissions might want to apply at home to distribution companies.

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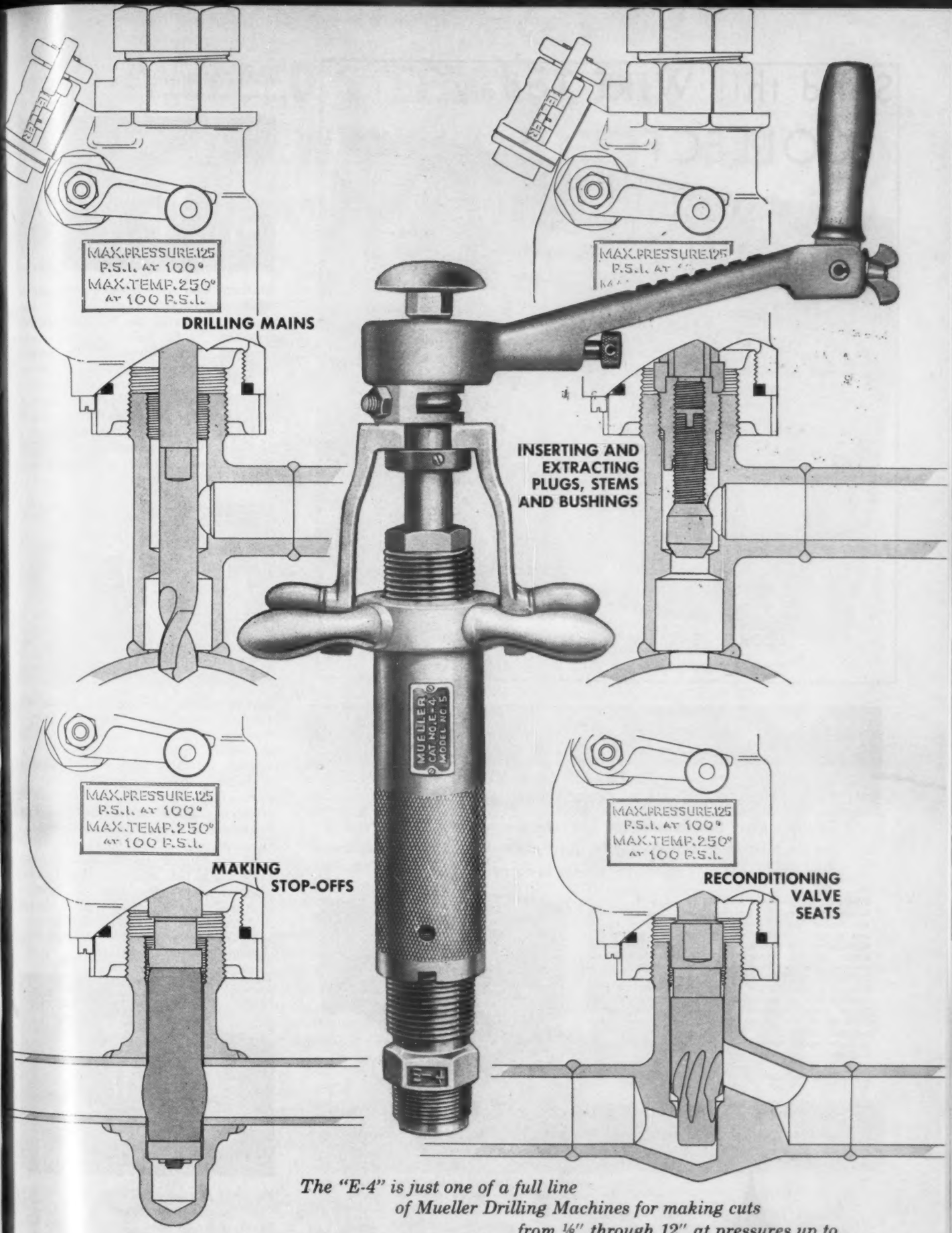
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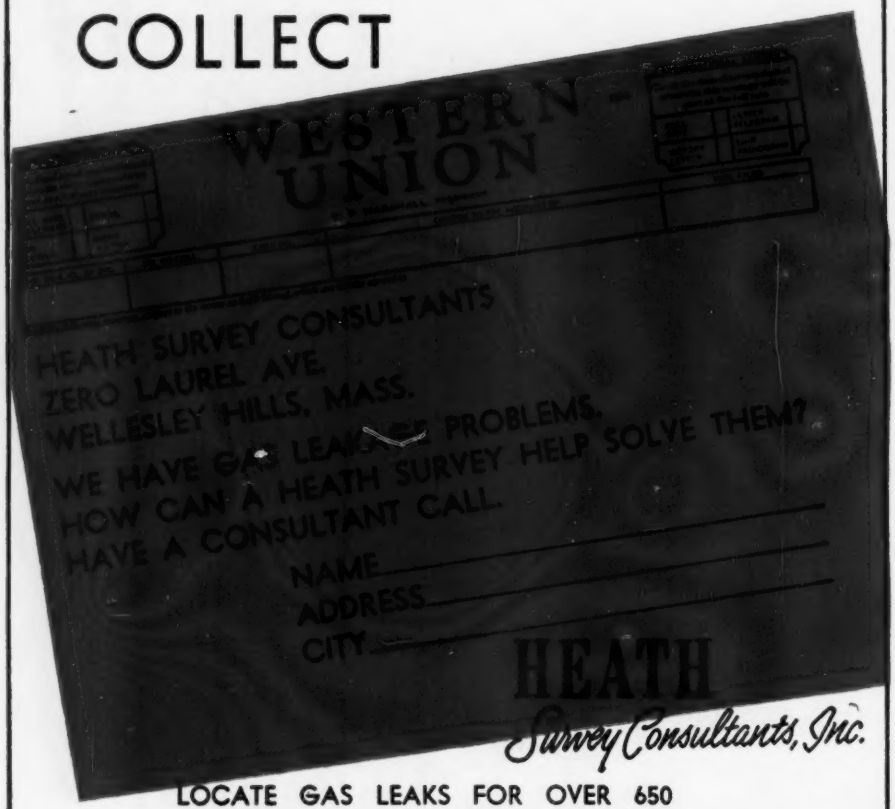

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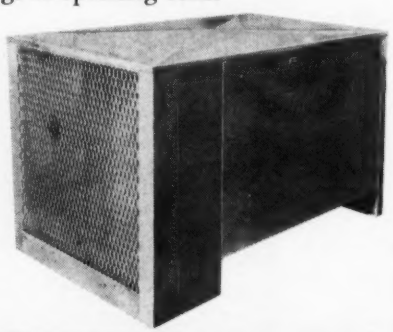

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News Hilites

Southern Gas Association's new slate of officers include left to right, H. A. Eddins, president of Oklahoma Natural Gas Co., president; C. L. Nairne, executive vice president, New Orleans Public Service, Inc., first vice-president; B. F. Wombacker, assistant treasurer, Southern Union Gas Co., treasurer, and Jack A. Bell, president, Gas Light Co. of Columbus, Georgia, secretary. Not pictured is Buell G. Duncan, president of Piedmont Natural Gas Co., Inc. who was elected second vice-president.

Named to New England Gas Association 1961-62 offices are, front row, left to right, Harold L. Dalbeck, president of gas companies of the New England Electric System, incoming president; Gilbert J. Williams, executive vice-president, The Connecticut Light & Power Co., retiring president; John F. Rich, president, New England Gas & Electric Association, first vice-president. In the back row, left to right, are Guy T. Henry, president, Providence Gas Co., who was named second vice president; Burdette A. Johnson, treasurer, New England Gas & Electric Assn., treasurer; and Clark Belden, managing director and clerk of the New England Gas Association.

Recently elected officers of the Mid-West Gas Association are left to right, C. J. Math, Iowa-Illinois Gas & Electric Co., president; K. W. Person, Minneapolis Gas Co., first vice president. Standing, left to right, are A. D. Schmidt, Northwestern Public Service Co., second vice president, and J. J. Finnegan, Northern Natural Gas Co. secretary-treasurer.

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A typical home in Chelmsford Farm Estates, where Lowell Gas Company has installed American® Meters and Reliance Regulators for maximum dependability and low maintenance costs.

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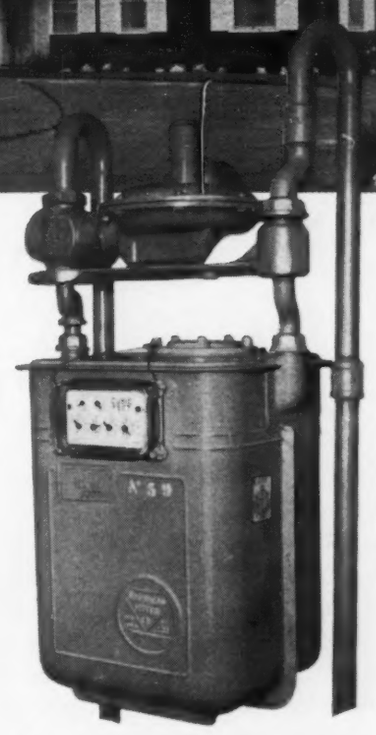

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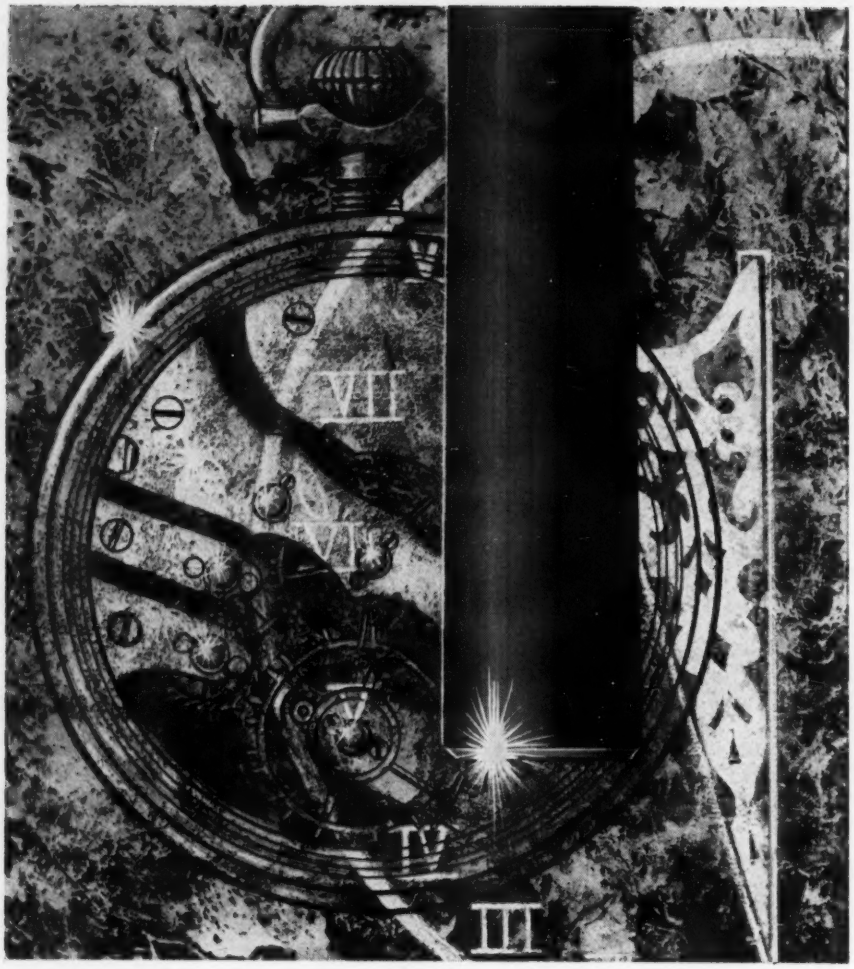

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New Hilites

Attack on two major disadvantages of present gas turbines—high purchase cost and high fuel consumption—has been launched by a joint Army-Navy development program. Sought is a 600-hp gas turbine with a specific fuel consumption as good as that of the diesel engine and better than that of the gasoline—0.4-lb/hp/hr. This, combined with light weight, small volume, and low maintenance, all specified in the development program, will assure turbine use in such Defense department applications as trucks, tanks, boat propulsion, pump compressor, and generator drives. Ford Motor Co. and Solar Aircraft Co. have been awarded contracts for the joint Army-Navy development of this turbine. Estimated cost of the program is $9,500,000.

Merger of Housatonic Public Service Co. into Connecticut Light and Power Co. became effective May 1. New CL&P area has been designated Housatonic Div. and will be headed by former HPS executive Richard F. Gretsch who will become division manager and supervise gas operations in the towns of Danbury, Newtown, Bethel, Brookfield, Ansonia, Derby, and Shelton.

Merger of MidSouth Gas Co. into Arkansas Louisiana Gas Co. has been approved in principle by directors of both companies. Only approval of stockholders and regulatory agencies having jurisdiction remains. When approved, the merger will mean exchange of one share of Arkla common stock for each two shares of MidSouth common. MidSouth serves 48,453 customers in 52 Arkansas communities and has headquarters in Little Rock.

Southern Cross Corp. has become the corporate outgrowth of Southern Cross Foresters resulting from the purchase by James J. Chaisson of his former partners' interest. Chaisson notes operations will continue with the same personnel delivering same services over the same area. R. Mayes Pierce has been promoted to vice president in charge of operations with the firm.

Sprague Meter Co. will continue to operate under its present name but as a division of its new owner, Textron, Inc. William A. Haist, Jr. will continue as president of Sprague and no changes in plant locations, management, or personnel are anticipated. Textron acquired Sprague in a cash transaction late in April and the sale was subsequently approved by Sprague stockholders at a meeting in Bridgeport.

Men At Work

● Growth of research volume at the Institute of Gas Technology has necessitated creation of three new positions. Named managers in charge of research in their respective areas are: **J. M. Reid,** engineering research and development; **W. G. Bair,** pilot plant operations, and **E. B. Shultz, Jr.,** energy and chemical conversion research.

● Delaware Power & Light Co., has announced election of the following company officers: **F. P. Hyer,** chairman of the board and chief executive officer; **A. T. Gardner,** president; **F. T. Bear, H. W. Clift, L. R. Leslie, J. W. Mackie,** and **G. M. Nelson,** vice presidents; **W. A. Hibbert,** secretary and treasurer; **J. M. Regelski,** assistant secretary and assistant treasurer; **L. T. Burbage,** assistant secretary and assistant treasurer; **N. W. Wolfe,** assistant secretary and assistant treasurer. The following appointments were also made: **H. J. Perkner,** comptroller, **W. M. Gamble,** assistant comptroller and **H. M. Barrett,** purchasing agent.

● **Joe Elliott** has been promoted to residential sales supervisor for Atlanta division of Atlanta Gas Light Co. He was formerly sales coordinator for the company. In another personnel change, **L. G. Folsom** has been named manager of safety and insurance department for Atlanta Gas Light.

R. M. Grogan

F. C. Eggerstedt Jr.

● Recent personnel changes at Long Island Lighting Co. include: election of **Russell M. Grogan** as vice president in charge of production, transmission, and construction; and election of **Charles R. Pierce,** former senior attorney, to assistant secretary. **Vincent T. Miles,** treasurer, has resigned because of serious illness, and **Fred C. Eggerstedt Jr.,** vice president in charge of finance, has been elected treasurer of LILCO; he will hold both titles.

● Consumers Power Co. has elected the following company officers: **A. H. Aymond Jr.,** chairman of the board, **James H. Campbell,** president, **Robert P. Briggs,** executive vice president; **H. Stanley Richmond, Claude A. Mulligan, Harry R. Wall, John B. Simpson, Birum G. Campbell, Walter C. Schmidt,** vice presidents; **John W. Kluberg,** controller; **Walter R. Boris,** secretary, and **George E. Olmsted,** treasurer.

A. W. Breeland

C. G. Barndt

● Lone Star Gas Company has announced election of **A. W. Breeland,** former assistant personnel director to vice president, personnel, and **L. B. Thaxton,** former assistant treasurer, to treasurer. The men succeed **Willard G. Wiegel** who retired April 1. Wiegel formerly held both positions. **Charles G. Barndt,** former director of promotion, was elected to the newly-created post of vice president, promotion.

● Indiana Gas & Water Co., Inc. has elected the following company officers: **Herman G. Horstman,** chairman of the board of directors; **J. W. Heiney,** president; **Fred W. Dopke,** first vice president; **Louis A. Kirch,** vice president, **Ernest B. Smith,** secretary; **John F. Kavanagh,** treasurer; **Hulda Johanningsmeier,** assistant secretary; **Howard E. Holmes,** assistant treasurer; and **Bernard J. Loonan,** assistant treasurer.

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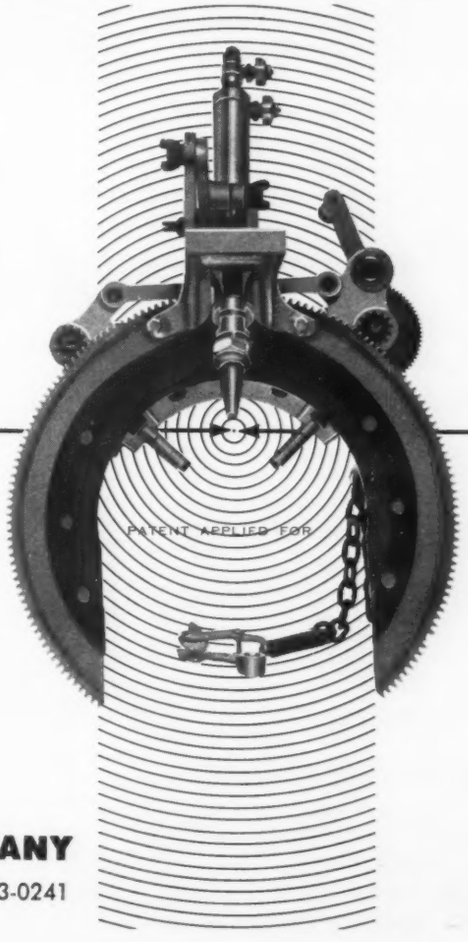

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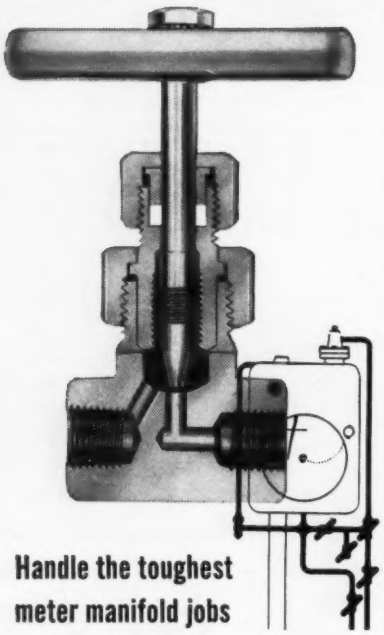

Handle the toughest meter manifold jobs and corrosive field services. Eliminate gland leaks.

Teflon-packed forged steel American® Needle Valves deliver year 'round dependable service—stand up under all conditions. Stainless or carbon steel precision machined valve bodies are ideally suited for welding. Stainless steel centerless-ground valve stem design makes it simple to repack valves under pressure.

Standard valves are design rated for pressures to 5,000 psi at 70°F. Upon request, assembled valves are hydrostatically tested to 10,000 psi (twice rated working pressure) and individually inspected. Valves are also furnished with graphite-impregnated asbestos packing for temperatures above 450°F.

Angle or straight patterns—screwed or union bonnets.

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AMERICAN® METER COMPANY

INCORPORATED ESTABLISHED 1836

General Offices:
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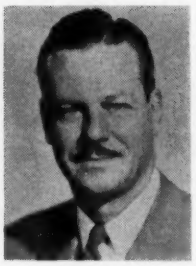
Men at Work

Vincent Farnsworth



W. C. Wolff

● Three new promotions at Boston Gas Co. include — **Vincent Farnsworth Jr.** to assistant vice president, **Willard C. Wolff** to vice president effective June 19, and **Jose deVaron,** former assistant secretary and assistant clerk, to assistant general counsel. In addition to Farnsworth's present duties as treasurer, assistant secretary and assistant clerk, he will be in charge of company's customer contact division, customer accounting-data processing division and financial division. Wolff will succeed **J. J. Quinn,** vice president in charge of sales since 1947, who will continue as vice president in general administrative capacities until his retirement in October 1961.

● **Evan D. Adams** has been named personnel director of East Ohio Gas Co. of Cleveland. Formerly personnel manager for Dewey & Almy Chemical Co., Adams will direct East Ohio's recruiting, employment, employee medical, welfare and recreational policies.

● **Ernest B. Blease** has been elected vice president of Northern Natural Gas Co. to head up the newly-created regulatory and forecasting division of Northern. He will direct preparation of applications to the Federal Power Commission for system expansion and rate revisions, supervise preparation of company budget, and direct company's long range forecasting activities.

● **P. D. Miller,** dealer sales manager for Ohio Fuel Gas Co., has been named to newly-created post of business promotion coordinator. **Gordon W. Collier,** central district business promotion manager, will succeed Miller as dealer sales manager.

● **Karl Shaver** has been elected secretary of the Columbia Gas System, Inc. Shaver, former assistant secretary, succeeds **Milton C. Baldridge,** who retired January 31.

● **Harold E. Rider,** president of Fairfield County Trust Co., has been elected a director of The Connecticut Light and Power Co. at a meeting of company's board of directors.

● **Leonard M. Hammer** has been named to the newly-created post of manager of American Gas Association's Gold Star Gas Appliance Program. **Stephen J. Van Osten** succeeds him as manager of A.G.A. Promotion Bureau.

● **Wallace A. MacDonald** has been elected secretary and assistant treasurer of Hartford Gas Co. **Carl Thomsen** succeeds MacDonald as assistant treasurer and assistant secretary.

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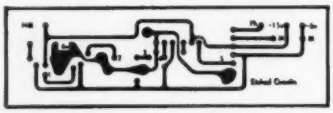
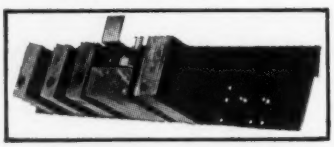
PIPE LOCATOR

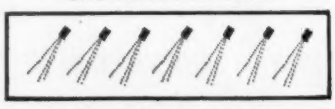
MODEL TR-1A



ETCHED CIRCUITRY



ENCAPSULATED PARTS



SEVEN TRANSISTORS

Utility and Construction Companies, Municipalities are unanimous in agreeing that MODEL TR-1A has proved most effective for locating mains, services, valves, conduit, high voltage lines, telephone cables. Easily separates parallel lines and can be used to trace non-metallic pipe lines. Complete piping systems traced out.

SPECIFICATIONS: Size of cases when clamped together: 9½" x 12½" x 5½" • Size of transmitter and receiver boxes, each: 9½" x 12½" x 2¾" • **Operating weight,** transmitter: 4½ lbs. • **Operating weight,** receiver: 4¾ lbs. • **Circuit:** Transmitter—one transistor, Receiver—six transistors • **Batteries:** Transmitter—4 size C flashlight cells, Receiver—4 size C flashlight cells • **Switching:** a. Automatic power switching for all "on-handle" operations. b. Automatic "turn-off" when set is not being used.

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Leading Electronic Manufacturers
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● American Gas Association has named **Philip B. Sheehan** manager of the newly-organized National Speakers Bureau. He formerly was assistant to the director of PAR, the AGA promotion, advertising and research program.

● **William G. Wepfer,** general sales manager of Arkla Air Conditioning Corp. has been elected a vice president of the company. He will also retain his previous duties as general sales manager.

● **Edward F. Watson** has been appointed division plant superintendent, Paterson gas plant, and **T. Laurence Powers,** has been appointed safety engineer, gas department, general office, of Public Service Electric and Gas Co. Powers succeeds the late Edward Baumann.

● Recent personnel changes at Lone Star Gas Co. include appointment of **Frank J. Shramek** to superintendent of buildings for Lone Star system offices; and appointment of **W. T. Eaton** to manager of Ranger customer service office succeeding **L. R. Conn** who has resigned. **Billy Joe Thogmartin** has been named local manager of distribution operations in Wellington, Texas, succeeding **T. E. Holley,** who has become district manager for Lone Star at Ballinger. **H. E. Lawson** has been named manager of company's Childress district of distribution succeeding **Doyle C. McKinney,** who has transferred to district manager of Grand Prairie.

● **Charles R. Montgomery** has been appointed assistant controller of Michigan Consolidated Gas Co. He is transferring from American Louisiana Pipe Line Co., an affiliate of Michigan Consolidated.

● Merger of Southern Colorado Power Co. into Central Electric & Gas Co. has resulted in a new corporate name, Western Power & Gas Co., and a new slate of officers. **Max McGraw** was elected chairman of the board, and **Judson Large,** president of the Lincoln, Nebraska-based public utility system. (Western Power operates natural gas distribution systems serving 98,000 customers in 65 Nebraska and South Dakota communities, including Lincoln, and Sioux Falls, S.D.) Other officers of the company are **Col. L. D. Densmore, Toral F. Duckett,** and **D. B. Hyer, Jr.,** executive vice presidents, **Kenneth L. Dally, Duane T. Swanson,** and **William Porter,** vice presidents.

● **John A. Ferguson** has retired as executive director of the Independent Natural Gas Association of America effective May 1, and assumed the newly-created post of consultant to the board of directors and assistant to the president. **Lawrence H. Gall,** in addition to continuing in the office of general counsel, will assume the duties of acting executive director.

● **L. Earle Merrow,** vice president of Orange and Rockland Utilities, Inc., has been elected to the board of directors of the company succeeding **Isaac S. Hall,** who is resigning as a director after approximately 30 years on the board.

● **Howard Hole,** previously plant superintendent for Honolulu Gas Co., has rejoined the utility as planning engineer. For the past year he has been on leave of absence serving as consultant to Anchorage Natural Gas Co. In another change, **Charles R. Woods,** staff engineer, has been named new Isle Gas operations engineer.

AMERICAN® VOLUME AND PRESSURE GAGE

The American Volume and Pressure Gage records the time and pressure at which each unit measure of gas passes through a meter. It may be used with regular, Base Pressure or Base Volume Indexes on large positive displacement meters.

Clock or Index-driven models available. The Clock-driven model records the exact time of peak loads and the maximum flow rates. Each unit volume of gas can then be corrected by the pressure factor, providing greater accuracy than a 24-hour averaging method. It will also indicate line breaks, and the gas volume passed during the break when downstream from the meter.

Index-driven model records pressure at which each unit volume of gas passes through the meter for correcting the volume to the base pressure.

See Bulletin 202 for details.

AMERICAN METER COMPANY

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Vermeer 4-T POW-R-DITCHER

Rugged, Low Cost Ditcher Digs 6"-14" Wide, 4½' Deep

This highly maneuverable 4T POW-R-DITCHER is only 46" wide . . . fast . . . and can handle most ditching jobs at a fraction of the cost of larger, more expensive units. The finest ditcher buy for low cost investment, low maintenance and high production.

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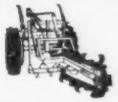

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Bookshelf

LP-Gas Service Training Course, Books III and IV. *Available from Liquefied Petroleum Gas Association, 11 South LaSalle Street, Chicago 3, Illinois. Priced according to special needs—home study or classroom study. Write LPGA for full details.*

Books III and IV complete the four part LP-Gas man's service training course being published by U. of Texas under a grant-in-aid from LPGA. Book III has 26 illustrated chapters covering basic information on sciences needed by servicemen, gas storage and piping systems, home installation, venting and all major appliances including heating and air conditioning. Book IV includes information on load balancing by special applications, providing heat for animals and plants, agricultural flaming using LP-Gas, dehydrating farm products, portable and nonportable industrial LP-Gas equipment, commercial cooking and water heating, and gas lighting. Like other volumes, both books have been edited by LP-Gas engineers and field tested by servicemen. Series unique adaptability to many forms of training stems from 3 supplementary texts supporting the basic information manual, key volume of each series. Other texts are an assignment book, a test book, and an instructor's guide.

STANDARD MAGNESIUM ANODES CUT MAINTENANCE COSTS, ELIMINATE HAZARDS, REDUCE UNACCOUNTED-FOR GAS!

Maintenance costs are skyrocketing. Yet a simple, effective method of reducing or completely eliminating these costs is with Standard Magnesium Anodes. And they eliminate hazards and reduce unaccounted-for gas.

A cathodic protection system using Standard Magnesium Anodes is inexpensive and easy to install. It will add years of maintenance-free life to old as well as new lines by stopping corrosion.

Protect that next installation by using Standard Magnesium Anodes.

FREE: Booklet describing how you can prevent corrosion.

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WATER HEATER ANODES • GROUND ANODES

Air Conditioning Sales Reference Manual, *(Catalog No. 112/I). Published by American Gas Association, 420 Lexington Avenue, New York 17, New York. Pages, 350. Price, $9.*

First sales reference manual ever published on gas air conditioning is designed for use both as a training aid and as a reference source for salesmen. Published in loose-leaf form, manual contains numerous tables and illustrations. It was published originally for students at the air conditioning sales school sponsored by the Gas Air Conditioning and Heating Committee of A.G.A.

How to Communicate Policies and Instructions, *by Joseph D. Cooper. Published by The Bureau of National Affairs, Inc., 1231 24th Street, N. W., Washington 7, D. C. Pages, 352. Price, $14.75.*

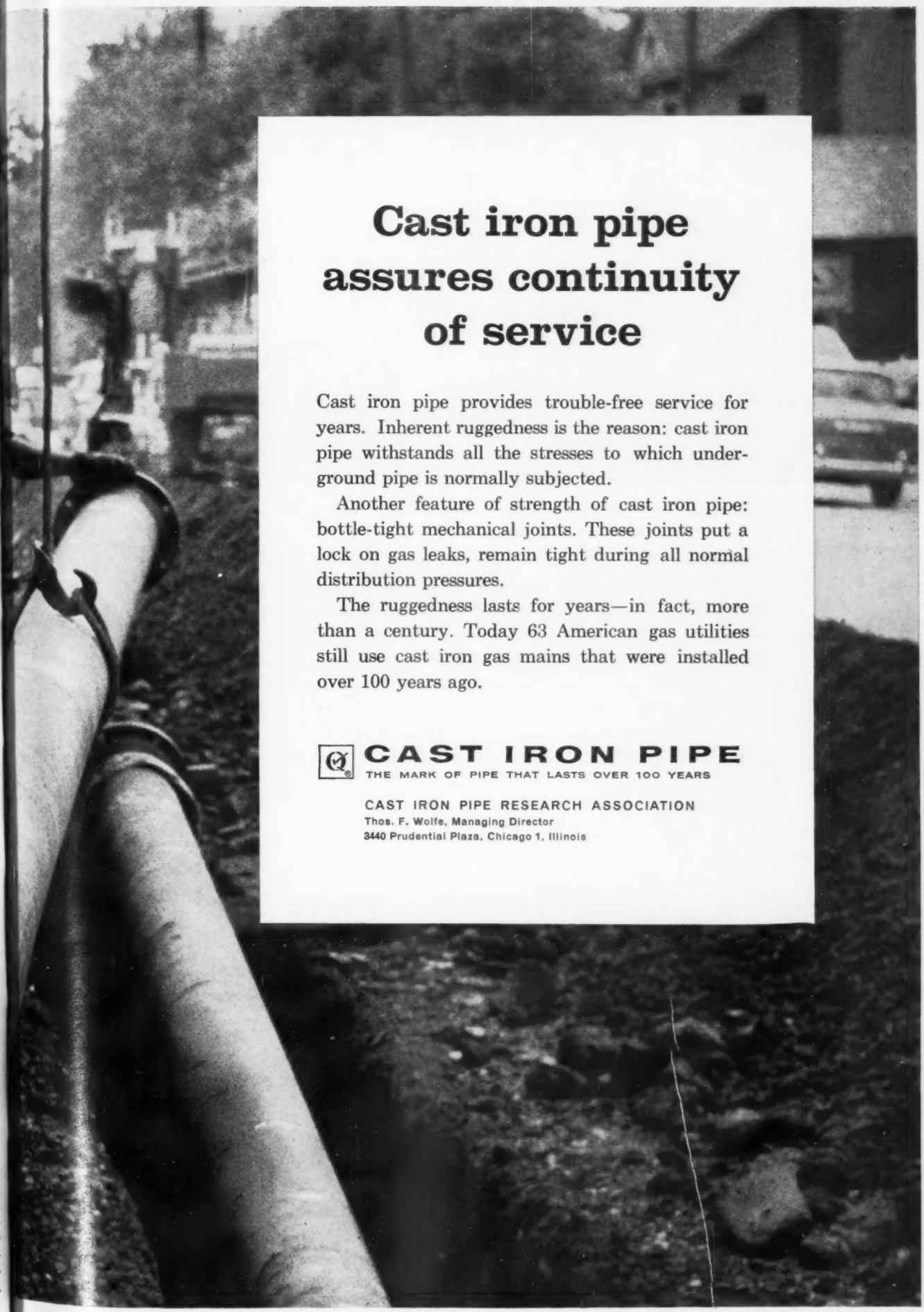
A strong attack against "officialese" or "gobbledegook" in written instructions, this book offers practical suggestions on how to avoid such communication errors. Book covers all types of instructions: Policy manuals, office manuals, technical, sales, and employee manuals, consumer "how to do it" or "how to use it" manuals or pamphlets, training manuals, etc. Dr. Cooper's thesis is that instructions must not only be simple and clear to the user, they must be designed for change and be readily revisable to reflect new needs and conditions so that, at any given time, there will be only one correct statement of official practice.

1960 Supplement to the AWS Bibliographies. *Published by the American Welding Society, 33 West 39th Street, New York 18, New York. Pages, 64. Price, $1.50.*

Similar to the original AWS Bibliographies and the subsequent yearly supplements, the recently-issued 1960 supplement contains bibliographies of articles on 28 subjects — from aluminum, pressure vessels including storage tanks, to submerged arc welding. The supplement covers material published in the *Welding Journal* from January through December of 1960. It has been designed for use as issued or as supplementary material to bring previously issued AWS Bibliographies (covering material since 1937) up-to-date.

Bibliographic Survey of CORROSION 1956, *Compiled by Nicole T. Atlas. Published by the National Association of Corrosion Engineers, 1061 M & M Building, Houston 2, Texas. Pages, 248. Price, $22.50 NACE Members, $27.50, Non-Members.*

Seventh in a series of NACE bibliographies on corrosion literature, this plastic bound paper back volume contains a collection of 2136 abstracts of technical literature published during 1956 in numerous periodicals over the world related to articles, books, and pamphlets on corrosion control. Abstracts are arranged according to their principal content classified under the NACE abstract filing index in which literature is classified under 8 main headings — *general, testing, characteristic corrosion phenomena, corrosive environments, preventive measures, materials of construction, equipment, and industries.* Abstracts are also cross indexed. Author index lists 2859 names.



Cast iron pipe assures continuity of service

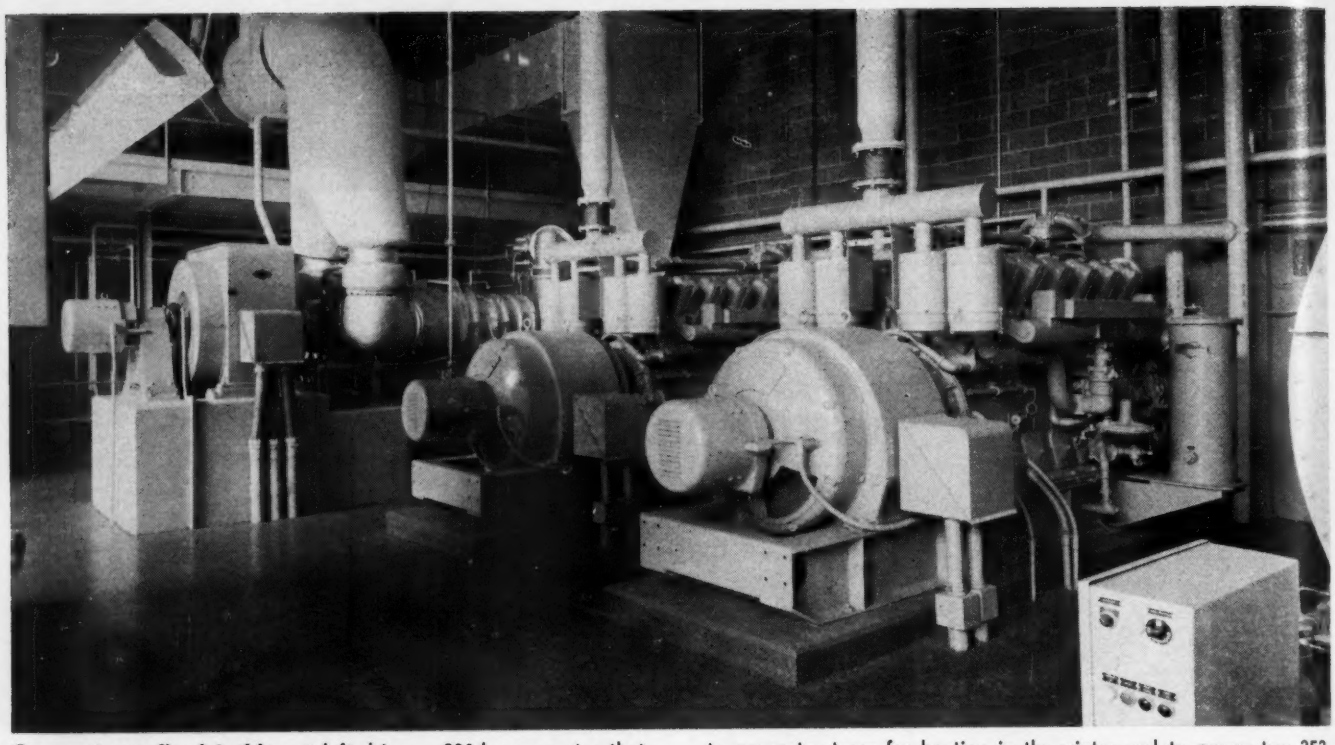
Cast iron pipe provides trouble-free service for years. Inherent ruggedness is the reason: cast iron pipe withstands all the stresses to which underground pipe is normally subjected.

Another feature of strength of cast iron pipe: bottle-tight mechanical joints. These joints put a lock on gas leaks, remain tight during all normal distribution pressures.

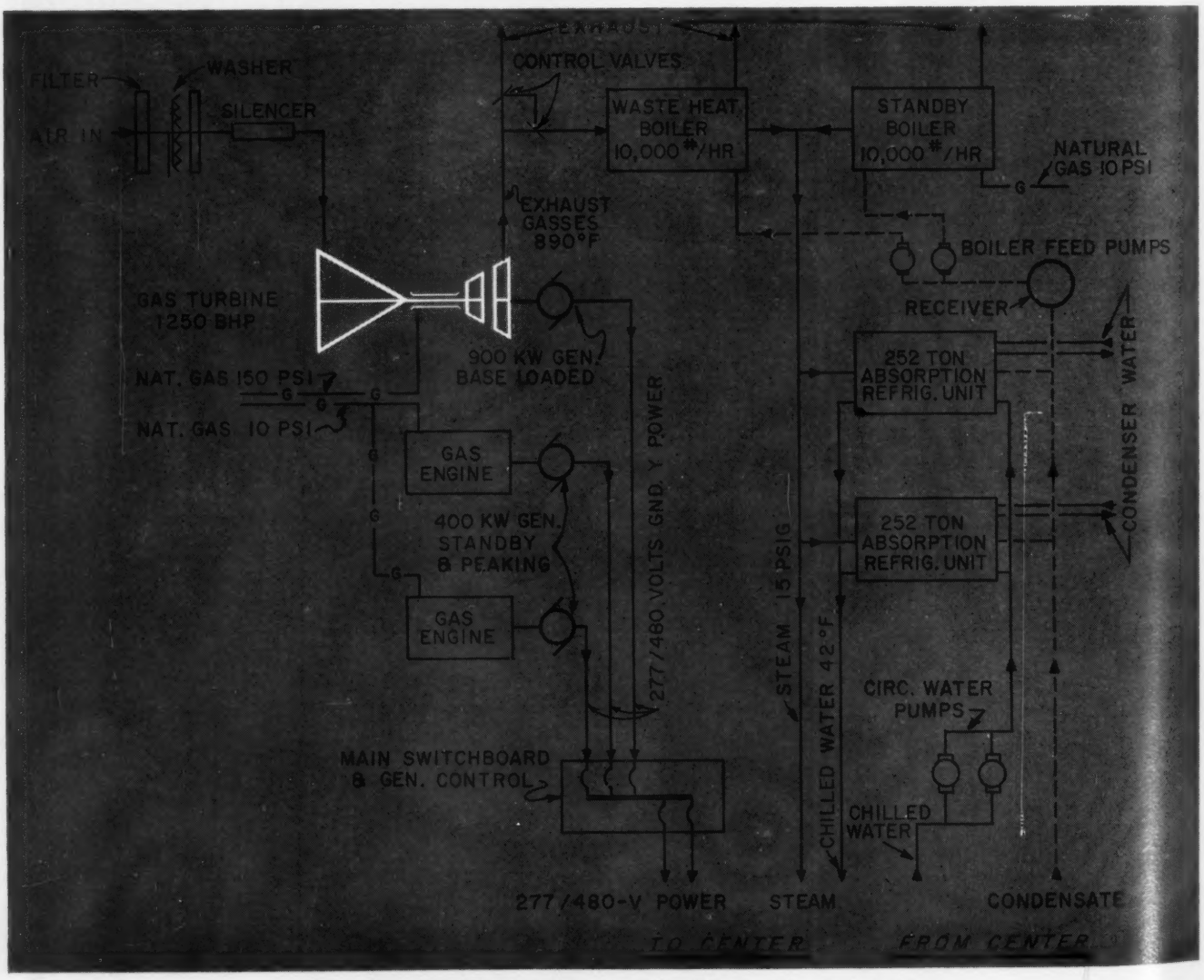
The ruggedness lasts for years—in fact, more than a century. Today 63 American gas utilities still use cast iron gas mains that were installed over 100 years ago.

CAST IRON PIPE
THE MARK OF PIPE THAT LASTS OVER 100 YEARS

CAST IRON PIPE RESEARCH ASSOCIATION
Thos. F. Wolfe, Managing Director
3440 Prudential Plaza, Chicago 1, Illinois



Compact gas-fired turbine at left drives a 900-kw generator that supplies all electrical power needs of Park Plaza shopping center. Exhaust heat from turbine is fully utilized, too, in waste heat boiler to generate steam for heating in the winter and to power two 252-ton absorption refrigeration units to provide chilled water for summer air conditioning.



Flow diagram of the Park Plaza Shopping Center utility plant details utilization of gas-fired equipment keynoted by the 1250-hp gas turbine.

Gas Does Everything At Park Plaza

Versatile 1250-hp gas turbine is key to unique utility center at new $5,000,000 shopping center where gas-fueled equipment provides heating, cooling, lighting, and electrical power efficiently and economically

Maury Hughes, Resident Engineer,
Leo L. Landauer and Associates, Little Rock, Arkansas

AN ALL-GAS CENTRAL POWER PLANT that takes care of all energy requirements, including lighting, heating, and year-around air conditioning, is the unseen but vital feature of the impressive new $5,000,000 Park Plaza Shopping Center in Little Rock, Arkansas.

Carefully woven into the architectural compactness and efficiency of the shopping center, the gas-powered utility center is designed to make the most of every cubic foot of economical natural gas that is consumed. The unique plant, first of its kind in the U.S., insures year around comfort for both tenants and shoppers at Park Plaza. Architects for the center were Groh-Withrow-Brueggeman. Engineering was accomplished by Leo L. Landauer and Associates in association with Arkansas Louisiana Gas Company.

Nucleus of the all-gas plant is a gas-fueled 1250-hp turbine driving an electric generator to provide 900-kw for the shopping center. That's enough power for an estimated 5000 homes. Exhaust heat from the gas turbine is utilized to produce steam for the center's winter heating season . . . and in the summer, the steam is utilized in two 252-ton absorption refrigeration units to provide chilled water for summer air conditioning.

The turbine produces the base load power supply for the center. Supplementing it are two gas-fueled engine-driven 400-kw generator sets used to provide peak power and for standby whenever the turbine is off-line for adjustment or routine maintenance.

The 1250-bhp Clark TA model gas turbine drives the 900-kw generator at 1200 rpm; the generator is a 277/-480-v., 60-cycle, three phase, Y-connected type, rated at 0.8 Pf. The two smaller generators are also 277/480-v., 60-cycle, three phase, Y-connected, rated at 400-kw each at 0.8 Pf, and are driven by Waukesha natural gas engines.

Heat recovery. In addition to driving the 900-kw generator, the gas turbine produces approximately 22 lb per sec of exhaust gases at 900 F. These gases are directed through a single pass, fire-tube type waste heat boiler. This boiler provides 10,000 lb of steam per hr at 15 psig. Steam produced is used for heating, cooking, domestic hot water heating, and in the two 252-ton Carrier absorption refrigeration machines to produce chilled water for summer air conditioning.

Fully loaded, the turbine-driven generator and heat recovery system reaches 61.75% overall thermal efficiency! Power generation requires 14.5% of the input heat and steam for various uses takes another 47.25% only 38.25% of the input is waste heat out of the stack. Selection of equipment was based on the fact that each component was already in operation in an industrial application elsewhere. It is anticipated that even higher efficiencies will be obtained in future installations by utilizing new equipment now on the market.

Because the available power of the gas turbine declines with a rising ambient temperature, the intake air to the turbine is washed in addition to being filtered. The American Air Filter air washer is designed to take full advantage of the wet bulb depression and will provide 82 F entering air to the turbine at design conditions of 95/79.

Rock garden with flowing stream in lower mall brings touch of nature to Park Plaza. Stairways and walkways make all stores easily accessible. Gas lights in the garden and around the center, along with gasigns, emphasize the full utilization of natural gas in Park Plaza.

Steam requirements in the summer are approximately 11,000 lb per hr and winter requirements are approximately 7000 lb per hr. In addition to the waste heat boiler, used for base load, a gas-fired boiler rated at 10,000 lb of steam per hr at 15 psig is used for meeting peak steam demands and for standby use.

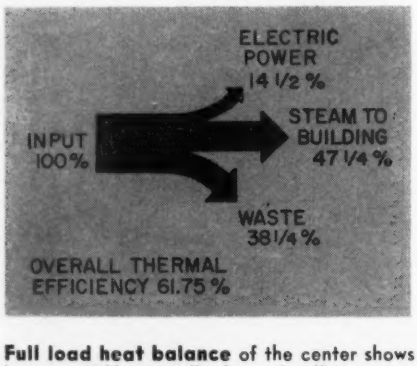
In the first 3543 hours of operation of the gas turbine, power outage has been only 8 minutes. The turbine will be inspected each 10,000 hours and replacement of the first stage turbine

Overall view of the 24-acre Park Plaza Shopping Center in west Little Rock, Arkansas. One of the newest and most modern centers in the nation, it is unique in having a complete, compact, gas-fired utility center to supply heat, cold, electric power, and lighting.

blades will not be required until 100,000 hours of operation (more than 11.4 years).

Designed for shopper convenience. Park Plaza represents a trend away from conventional, older-type shopping centers with their sprawling strips of store-front along streets and highways.

The 24-acre center in west Little Rock, designed by architect Edward F. Brueggeman, is built on two levels. The main building is two-story, of mall-type construction. All service is from a single side. A delivery tunnel provides truck service beneath the mall to tenants located on the front of the building.



Full load heat balance of the center shows how 61.75% overall thermal efficiency is obtained.

The lower mall contains an artificial stream with a flow of 210-gal per min. The stream emanates from a waterfall at the upper level and flows the full 600-ft length of the building. Stream banks are planted with flowering shrubs.

Gas lights are used throughout the mall area and on the property boundary for effect and to help emphasize the use of gas for heating, cooling, and power generation for the center.

Heating. Steam at 10 psi from the central plant is available at each rentable space in the main building the year around for heating, cooking, and domestic water heating.

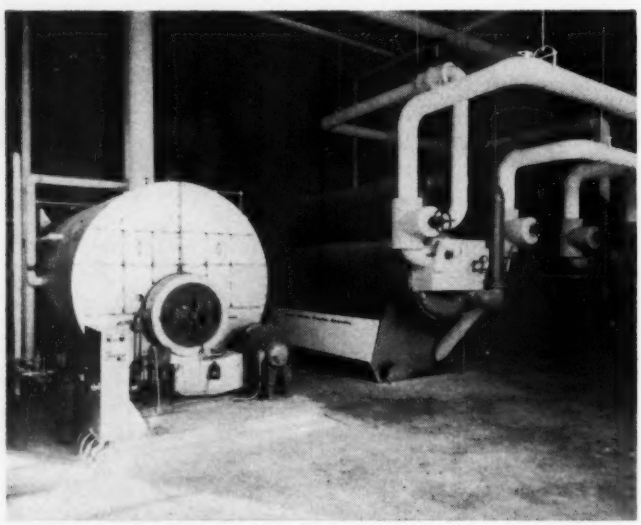
Cooling. Chilled water is available at each rental space in the main building for air conditioning use and is piped direct from the central plant.

Electric power. Each tenant on the site is furnished power at 277/480-v and individual transformers in each space provide 120/208-v power as required.

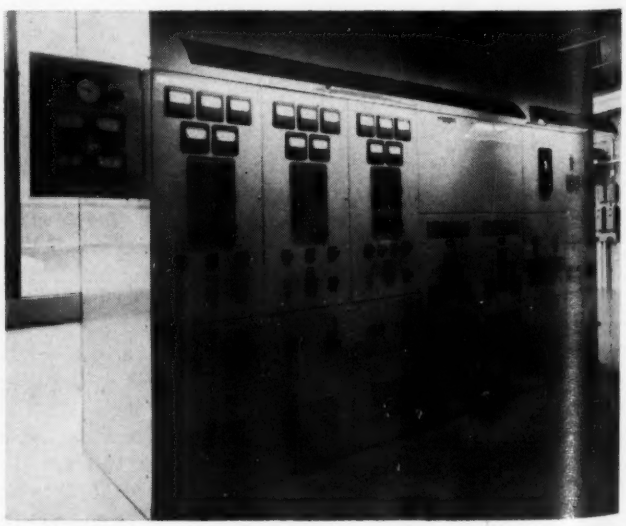
Lighting. Lighting in each space is tailored to the tenants' requirements, and fluorescent lighting is generally operated at 277-v. Malls are illuminated by means of 277-v fluorescent lighting units. Parking areas are illuminated to level of 2 ft-candles utilizing 440-v ballasts and color-corrected mercury vapor lamps. Mall and area lighting is controlled at the power plant.

Metering. Electrical service to each tenant is furnished through a kilowatt-hour meter of the indicating demand type.

Small spaces (below 10,000 sq ft) are charged for heating and cooling on a square foot basis. For larger spaces (over 10,000 sq ft), chilled water and condensate are metered. Btu meters are installed in chilled water lines and condensate meters are installed on condensate return lines. * * *



Waste heat boiler at left converts exhaust heat of gas turbine to useful energy in form of 10,000 lb of steam per hr to operate the two 252-ton absorption cooling units at right.



Control panel is nerve center of the Park Plaza power plant.

Service Renewals With Copper Tubing

Robert B. Catell, *Staff Engineer*
The Brooklyn Union Gas Company
Brooklyn, New York

Brooklyn Union Gas Company has completed approximately 31,000 service renewals using copper tubing since the commencement of the service renewal program in 1946. An additional 11,000 are planned in 1961. This economical and rapid method of replacement has enabled Brooklyn Union to renew all services in many of the old areas of its territory. And, the reduction in the number of service leaks occurring each year has, in the company's words, more than justified the continuance of this program.

A problem inherent in the operation of the distribution system of any gas utility is the replacement of old gas services. It is desirable to accomplish these replacements in the most economical manner.

The Brooklyn Union Gas Company has adopted the insertion of copper tubing through the old gas service. This decision was based on the fact that only one small roadway opening is required to install a copper insert. Previously, service renewals were made by excavating, removal of service and replacement with new coated wrapped steel lines.

The reduction in the amount of excavation required, along with restoration of pavement, is in itself a great savings. The physical advantages of pneumatic tools, specially designed equipment, well developed procedures, and trained personnel have made it possible to install a copper service at considerable savings.

The use of copper tubing for service renewals was first investigated in 1946. A neighboring gas company was engaged in installing copper inserts at that time. The technique being used was studied, and the necessary tools were purchased. The major part of the equipment was hand-operated and limited the length of the renewal. Deposits found in many of the old services were almost impossible to remove with hand operated tools, thus nullifying the economy of this method at that time.

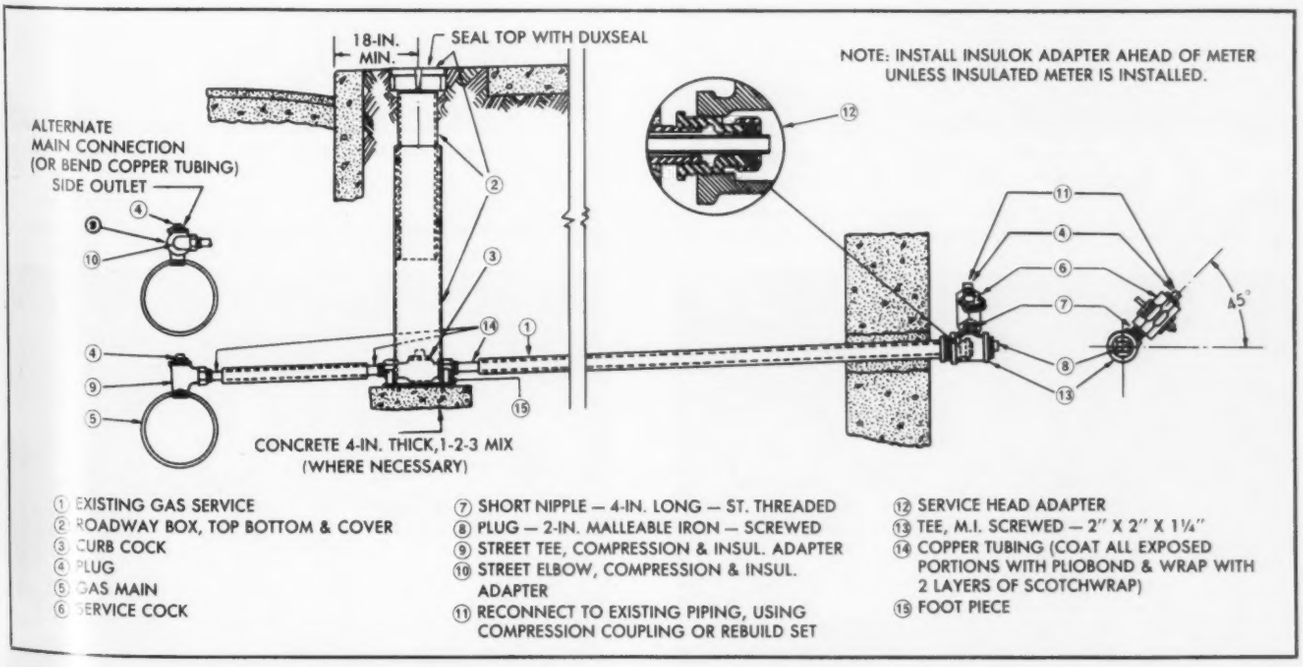
In the following six years, a great deal of progress was made with the development of pneumatic tools and special equipment, which have been proven to be essential for economical operation.

In 1953, a training program was set up, employees were selected, and the necessary tools and fittings were purchased. These trained personnel were used mainly on street improvement projects. All the services over forty years old were replaced prior to the street being repaved.

It also became apparent at this time that copper renewals could be used to great advantage on emergency service repairs. In the past, the practice was to barhole, to locate the leak, excavate, and make temporary or permanent repair as the case warranted. If a temporary repair was made, it was necessary to return at a later date and make the permanent repair. It was now possible to make one opening over the main, and in about the same time it took to locate and repair the leak under the old practice, install a copper insert.

In 1954, special trucks were designed for this operation. They were equipped with a compressor and tools for this type of work. These copper insert units, as they are called, are manned by a crew of three men, and can install two to three services a day. A foreman with a radio-equipped car will supervise three of these units, and will dispatch them to the leak location, upon receiving it from the street section dispatcher.

In order to determine areas where copper inserts would prove most effective, a service leak record was set up. A list of the areas in which the leaks appeared was obtained and the age of the services were also recorded. The majority


18-IN. MIN.
SEAL TOP WITH DUXSEAL
NOTE: INSTALL INSULOK ADAPTER AHEAD OF METER UNLESS INSULATED METER IS INSTALLED.
ALTERNATE MAIN CONNECTION (OR BEND COPPER TUBING) SIDE OUTLET
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CONCRETE 4-IN. THICK, 1-2-3 MIX (WHERE NECESSARY)
① EXISTING GAS SERVICE
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③ CURB COCK
④ PLUG
⑤ GAS MAIN
⑥ SERVICE COCK
⑦ SHORT NIPPLE — 4-IN. LONG — ST. THREADED
⑧ PLUG — 2-IN. MALLEABLE IRON — SCREWED
⑨ STREET TEE, COMPRESSION & INSUL. ADAPTER
⑩ STREET ELBOW, COMPRESSION & INSUL. ADAPTER
⑪ RECONNECT TO EXISTING PIPING, USING COMPRESSION COUPLING OR REBUILD SET
⑫ SERVICE HEAD ADAPTER
⑬ TEE, M.I. SCREWED — 2" X 2" X 1¼"
⑭ COPPER TUBING (COAT ALL EXPOSED PORTIONS WITH PLIOBOND & WRAP WITH 2 LAYERS OF SCOTCHWRAP)
⑮ FOOT PIECE

Installation of copper tubing through existing low pressure steel services is illustrated by diagram.

of these leaks occurred in the older services. Therefore, blocks were selected and the older services were replaced with copper.

To further improve this system of area selection, a large map of the entire territory was used on which all service leaks are plotted. If any area shows a predominance of leaks, a mobile leak detector is used to inspect the area. The sensitive nature of this instrument will indicate the presence of gas at any of the gas services. Any service that is leaking will be repaired immediately. If a particular block has a number of service leaks, a copper insert crew is sent in and will replace all the older services in that block.

The most efficient crew for this mass replacement consists of seven men under the direction of a foreman. Three men work on the copper installation, and the other four concentrate on excavation and backfilling. This crew is equipped with a supply van for storage of the necessary equipment and material. Pneumatic equipment is operated from a portable compressor.

There is a team of two men from the customers service department with each seven man crew. This team does all the inside meter and header work and restores service to all the gas appliances in the residence. This keeps customer inconvenience to a minimum.

If a large number of replacements are located in one block, this seven man crew can average seven replacements a day.

In 1958, there were two seven man crews in operation on street improvement projects and blocks with previous leak histories. There were seven mobile copper units working on leak complaints. At this time it was decided to further expand the copper program on an age and area basis, and a contractor was engaged. The contractor's personnel were trained by observing the operation of our own crews. After a sufficient length of time, the contractor began installing copper inserts under company supervision. The contractor's crew consists of seven men and a foreman, along with an experienced company mechanic to supervise the contractor's installation. Customers service personnel continue to do all the meter and header work, as previously mentioned.

A well defined procedure has proven to be of valuable aid in supervision, training of personnel, effective cost reduction and increased production.

The consumer is notified and the service is checked in the basement. The service is traced out to the main by the use of a pipe detector. A 3-ft by 3-ft opening is excavated over the main, the service is located and cut off 12-in. from the main connection. The fittings are removed and the tap is plugged. The head of the service is disconnected in the cellar by cutting the riser as close as possible for a convenient connection. A steel *snake* is pushed through the service to determine if any offsets are present and the pipe is reamed thoroughly at both ends.

A dust receptacle is attached to the cut service in the trench and the line is blown out from the cellar. A *tubing guide* is placed on the head of the service and a *tube cleaner* with air hose attached is installed. The air is turned on and the cleaner is run slowly through the entire length of pipe. The air is turned off and disconnected from the cleaner hose.

An air-operated pulling winch is lowered into the street excavation; the cable, attached to the cleaner hose, is pulled back into the basement.

The end of the copper tubing is prepared with a forming tool and a special pulling tool is inserted. The end of

1 **Old service is excavated at main.** Typical equipment used, left to right, includes air-operated winch, pipe tools, steel "snake."

2 **Heavy-duty boiler tube cleaner** is inserted into old service from cellar side.

3 **Air-operated winch cable** is pulled into cellar from outside.

4 **Cable is attached to special pulling tool** inserted in copper tubing. Tubing guide is attached to end of old service.

the pulling tool can then be attached to the winch cable. The winch is put into operation and the copper tubing is drawn into the service pipe. The pulling operation being completed, the air winch cable is detached, air hoist is removed from the street excavation and pulling tool is removed from the tubing.

The main tap plug is removed and the copper service main fittings are installed with an expansion stopper inserted in the street tee. The tubing and main fittings are aligned, the tubing is pushed by hand into the fittings and the connection at the main is completed. The copper is cut 10-in. from the end of the service in the cellar and a service head adapter is installed using a tapered dowel to straighten the tubing.

The excess copper tubing is cut ½-in. from the end of the adapter, and the header is completed. The stopper is removed from the street tee at the main and a plug is installed in order that the main and header connections can be tested for leaks. Insulating tape is applied to the exposed tubing and fittings in the excavation and the opening is backfilled.

The two most important tools required to perform this work are an *air-operated winch* and a *heavy duty boiler tube cleaner*. The air winch has a rated load of 100-lb at 50 fpm, a stalling load of 1800-lb, and is equipped with a special harness. The boiler tube cleaner is powered by a ¼-hp air motor and is equipped with a universal joint and tapered cutting head. Size of the cleaner will vary with the size of the service to be cleaned.

Special equipment designed for this operation consists of a *rubber expanding pulling tool* and a special *tube guiding head*. The pulling tool is inserted in the end of the tubing and expanded. It is then connected to the cable of the pulling winch to draw the copper through the service. The tube guiding head is then screwed to the basement end of the old service. This guiding head straightens the tubing before it enters the pipe and permits renewals to be installed in limited spaces.

The tubing used is *Type K Soft Rolled Water Tube*, which has an analysis of 99.96% copper and 0.04% metallic oxygen with a critical temperature of 80 F. It can be purchased in 60, 80, and 110-ft coils depending on the need. The sizes being used are ⅞-in., 1⅛-in. and 1⅜-in. OD, with a wall thickness of 1/16-in. Tubing of 1⅜-in. OD will be pulled through an existing 1½-in. service. In order to reduce the amount of scrap resulting from the large rolls, 15 and 20-ft lengths, which are left over, are joined together and utilized for short services.

Tubing connections at the main and at head of the service are made with compression fittings. A compression street tee is used at the main and an adapter is used at the service head. A house tee may be used on 1¼-in. services, as it incorporates the compression feature in the run of the tee with a machined recess, into which a 1⅛-in. gasket and backing washer are set. If the service head adapter is used, a reducing tee is necessary to compensate for the increase in pipe size of the adapter as compared to the original service. The riser is then connected to the head of the service with a compression coupling and gas service may be restored to the consumer.

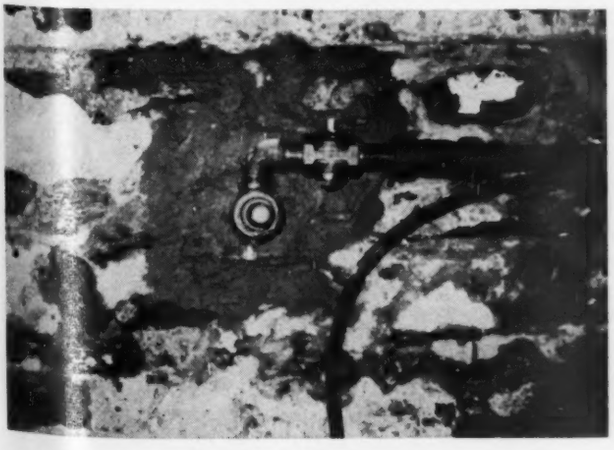
Techniques being used in the service renewal program are constantly reviewed. Many improvements in both methods and equipment have done a great deal to facilitate and expedite these service renewals, and still further, add to their economy.

* * *

5 **Winch is placed in the excavation** and operated, drawing the tubing into the service.

6 **Tubing is fed** into the service from the cellar.

7 **Completed header connection** in basement, showing tee, elbow, service cock, and dresser-style coupling reconnected to old line.



8 **Completed side outlet connection** at main. Insulating tape has been applied to exposed tubing and fittings.

System operator's office is responsible for maintaining gas intake within contract limits, proper regulation of line pressures, scheduling of peak-shaving production, withdrawal of line pack, and use of excess purchased gas in summer low-demand periods. Instruments in main panel at Poughkeepsie continuously record line pressure, flowing temperatures, and gas flow through Central Hudson's distribution lines.

Extensive network of telemetering, analog computing, and automatic integrating and printout combined with remote regulator and valve controls aid dispatchers in providing . . .

Precision Gas Receival at Central Hudson

Walter J. Gundersen, *Assistant System Operations Engineer*
Central Hudson Gas and Electric Corporation,
Poughkeepsie, New York

Insuring economical use of fuel gas from four separate sources to satisfy the industrial and residential demands of New York State's growing mid-Hudson region requires unusually precise flow control at Central Hudson Gas and Electric Corporation. To transmit and digest system data with the speed necessary for such control, Central Hudson has installed an extensive network of electrical telemetering, analog computing, and automatic integrating and printout. System response to operational decisions has been held to a matter of seconds with remote regulator and valve control facilities.

The complexity of its dispatching problems and of the instrumentation applied to solve them is very new to this, one of the country's oldest utility companies. Central Hudson's evolution can be traced to a direct predecessor operating in 1900 and, less directly, to several gas producers and distributors in existence fifty years earlier. The present corporation was formed by the merger of some 60 forerunner companies in 1926.

Prior to 1950, the problem of supplying the system's gas demands was relatively simple. Gas production facilities at Central Hudson's Poughkeepsie Gas Plant accommodated normal operating loads, and, when necessary, supplementary production was initiated at its smaller plants at Newburgh and Kingston. Since all three production stations were manned, sufficient data for operational decisions were obtained from gas pressures and flow rates monitored at the plants and coordinated by phone every hour.

In August 1950 Central Hudson converted to natural gas by extending a 10-inch line from Poughkeepsie to Tuxedo, New York, where it was tapped into the Port Jervis line of the Home Gas Company (part of the Columbia Gas System). The initial contract with Home Gas was a basic one, establishing a firm commodity rate and specifying that the demand rate be determined by the actual maximum daily requirement during the fiscal year beginning November 1, 1950. Dispatching at that time, therefore, amounted simply to taking sufficient gas from the Home Gas tap to meet

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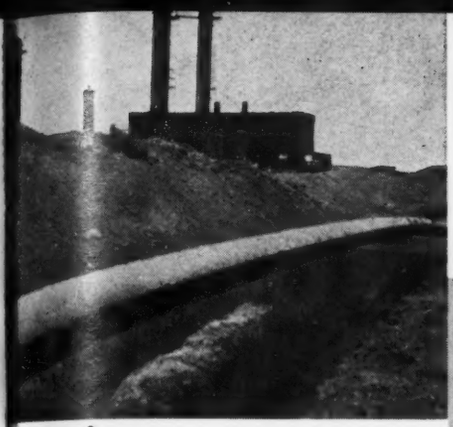
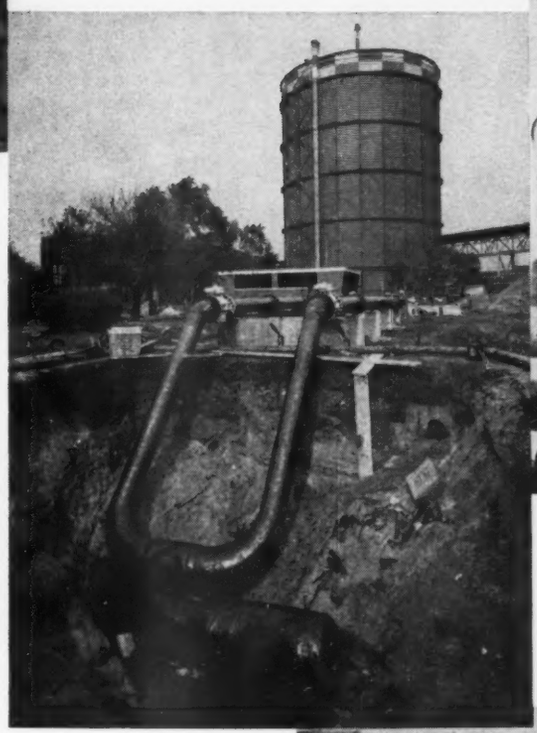
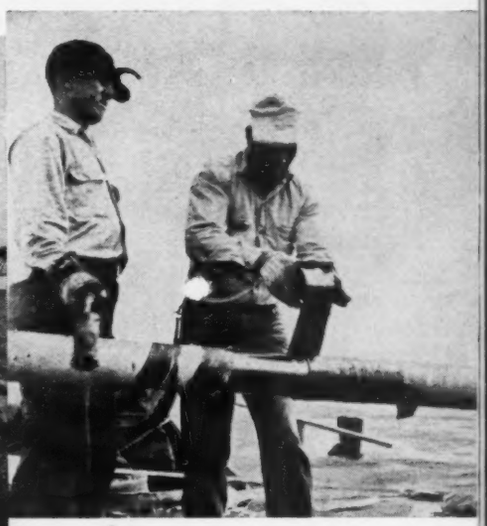


NATURAL GAS lines at compressor and meter stations give years of maintenance-free service when protected by TAPECOAT, the coal tar coating in handy tape form.

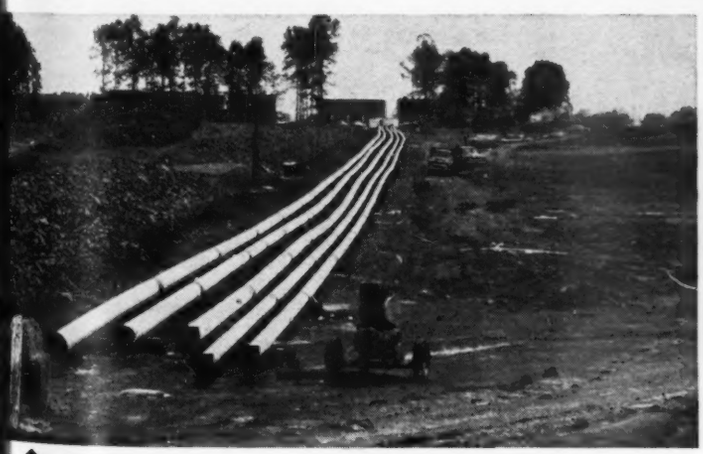
GAS DISTRIBUTION lines of large diameter can readily be protected with TAPECOAT to withstand the abrasive and corrosive climate in underground service.





Lines in **OFF-SHORE DRILLING** operations need joint protection equivalent to the mill-wrapping on the pipe. TAPECOAT is most economical because it gives lasting protection in underwater service.

CABLE AND CABLE SPLICES in communications service are effectively and economically protected by TAPECOAT.

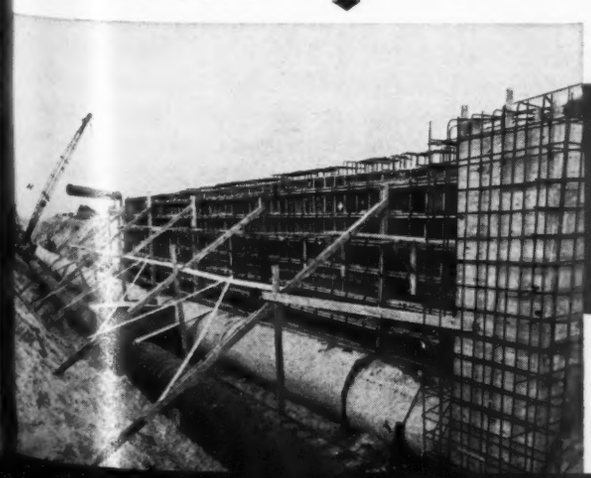


UNDERGROUND GAS STORAGE facilities can be "buried and forgotten" when protected by TAPECOAT. Note protection of tanks, pipe and pipe joints.

IRPORT FUEL LINES need e quality joint protection as-red by TAPECOAT. It is easy apply by spiral or "cigarette" rapping depending on the size the pipe. No training needed.

STEEL MILL water lines in this new plant are joint-protected with TAPECOAT. TAPECOAT can be used to advantage to protect any steel surface in underground service, as proved since 1941.

Lines buried in cinders in **RAILROAD YARDS** need the sure protection provided by TAPECOAT. There's a size for every purpose from 2" to 24" in width.



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normal loads and to minimize peak demand with manufactured gas in unusually cold weather.

Peak shaving was made practical with the development of a high-Btu oil gas production process using the existing Poughkeepsie plant. This process, known as the "Poughkeepsie Process," was developed by Central Hudson with the consultation of the Semet-Solvay Engineering Division of the Allied Chemical Corporation. The oil gas produced, rated at about 1000 to 1050 Btu per standard cubic foot, is compatible with natural gas (delivered from 1028 to 1030 Btu per SCF), whereas the carbureted water gas previously manufactured at Central Hudson's production plants (containing approximately 537 Btu per SCF) would have been unsatisfactory in burners converted to the richer natural gas.

Although changing to natural gas allowed Central Hudson to discontinue its gas production facilities at Newburgh and Kingston, monitoring facilities were maintained at those points. Since the required operating data remained rudimentary, system control was still practical using the pressure and flow information relayed by phone from those stations to Poughkeepsie.

Rapid expansion in the demands on its system from gas distributors along the East Coast required Home Gas to revise the form of contract in 1954. The new agreement required Central Hudson to specify its maximum daily gas requirement for the following fiscal year and provided severe penalty charges for exceeding this contract demand.

Since more positive control of flow from the Home Gas line had become essential, a temporary office was established at Tuxedo where an operator was stationed during the December to March high load period. He functioned as a flow controller and relayed pressure and flow information by radio to the gas dispatcher at Poughkeepsie. The dispatcher was responsible for insuring against overrun and for scheduling oil gas production to maintain safe operating pressures through the system.

Early in 1957, as plans were being made to increase the system's natural gas intake and to expand its distribution facilities, Central Hudson installed its modern telemeter, computer, and remote control system to permit faster, more flexible supervision.

In November 1957, a new 10-inch line was completed from Kingston to Cedar Hill (just south of Albany) that tapped into the Tennessee Gas Pipeline Company's transmission line to New England.

Several distinct advantages were realized through this expansion: additional gas was obtained to accommodate Central Hudson's rapidly growing market; a lower commodity rate was paid for the Tennessee gas; a gas supply was made available to the northern part of the Central Hudson system without passing through the relatively low capacity lines then existing between Kingston and Highland; and, because the Cedar Hill tap was made directly into the large New England line, extremely high pressures were available from the Tennessee system.

High pressure from Cedar Hill made available a fourth important gas source — line pack — to supplement the Home Gas and Tennessee intakes and oil gas production in meeting peak demands. By maintaining high pressure in its primary (900 psi) lines, Central Hudson is able to store up to 8,800,000 cu ft of gas as usable line pack. The stored gas, equal to about 20% of peak day sendout, is accepted during low demand periods and is immediately available for peak-shaving use. This type of storage, involving no additional cost to Central Hudson, constitutes a major benefit from the line extension. Hourly load calculations include computation of change in line pack as well as the automatically computed intake data in determining actual sendout.

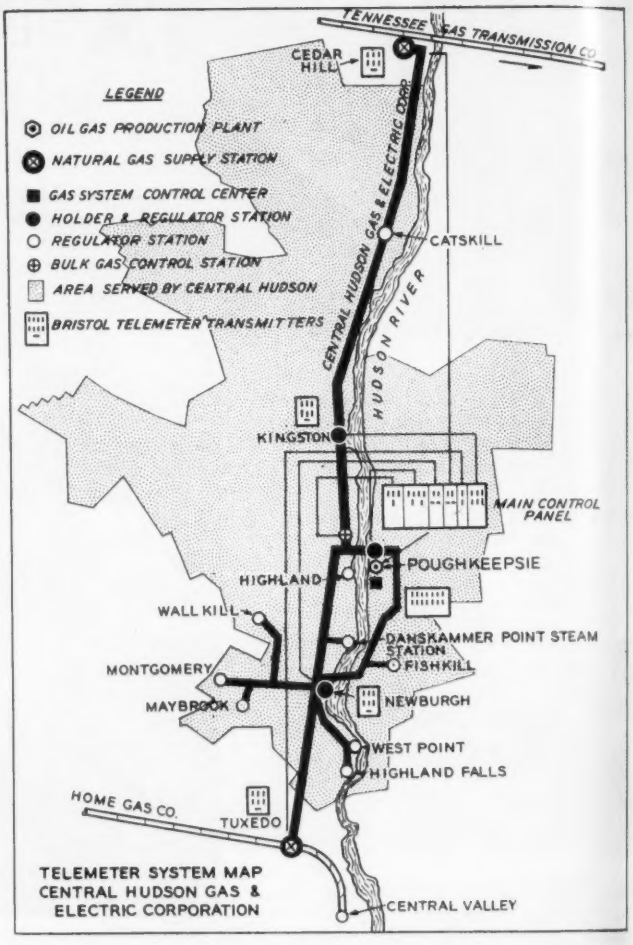

FIG. 1. **System map** shows location of telemetering equipment. Central Hudson Gas and Electric serves some 41,000 gas customers along Hudson River in east-central New York state.

Telemetering, Computing, and Control

Centralized control of gas intake from both pipelines and regulation of distribution pressures depend upon data transmitted through the *Metameter** telemeter system shown in Fig. 1. A complete profile of both computed and basic system variables—actual flow rates, pressure, differential pressure across metering orifices, and flowing temperature — is made available at the system operator's panel at Poughkeepsie. Minimized telephone line rental cost is achieved with the use of *Hammarlund* tone multiplexing equipment that permits the transmission of multiple variable signals over each leased line.

Primary measurements are communicated to the central control area where they are individually recorded and fed to the gas flow computers. All data is displayed on 15 panels approximately 8 ft high and totaling 30 ft in width. The dispatching desk, facing the control panels, is equipped with radio, carrier, and telephone communications facilities. Adequate alarm systems are incorporated in the control panels to alert the gas dispatcher immediately of any pressures occurring outside of established operating limits. Weather data is transmitted to the dispatcher via teletype from Boston and Albany.

In case of loss of any individual flow variable signal, provision is made for manual input of an assumed value

*Registered trademark of The Bristol Company, Waterbury, Connecticut.

Carmen Logana, (left) foreman of meter shop, and J. Dugan, superintendent of Gas Measurement, Niagara Mohawk Power Corporation, Syracuse, N.Y.

"None of our Reeves-Vulcan synthetic diaphragms have ever needed replacement in OVER TWENTY YEARS!"

"Over 72,000 of our active meters are equipped with Reeves-Vulcan synthetic diaphragms," says Mr. Dugan. "In our new stepped-up program of meter maintenance – in which we can process 10,000 meters a month – we have ample opportunity to check the performance of these Vulcan diaphragms.

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TELEMETER COMPARISON
MAY 1960

Date	Telemeter	Actual Billing Receival	Mcf. Difference	% Difference	Correction *	Difference **	% Difference
1	8,000	7,796	204	2.6	(-69)	135	1.7
2	7,996	7,824	172	2.2	(-81)	91	1.2
3	8,002	7,820	182	2.3	(-91)	91	1.2
4	7,997	7,819	178	2.3	(-99)	79	1.0
5	8,002	7,751	251	3.2	(-108)	143	1.8
6	7,897	7,688	209	2.7	(-95)	114	1.5
7	7,895	7,706	189	2.5	(-90)	99	1.3
8	7,894	7,747	147	1.9	(-67)	80	1.0
9	7,900	7,730	170	2.2	(-84)	86	1.1
10	7,897	7,670	227	3.0	(-127)	100	1.3
11	7,899	7,666	233	3.0	(-131)	102	1.3
12	7,897	7,629	268	3.5	(-136)	132	1.7
13	7,899	7,650	249	3.3	(-122)	127	1.7
14	7,900	7,713	187	2.4	(-103)	84	1.1
15	7,900	7,681	219	2.9	(-108)	111	1.4
16	7,900	7,702	198	2.6	(-111)	87	1.1
17	7,899	7,688	211	2.7	(-118)	93	1.2
18	8,029	7,813	216	2.8	(-148)	68	0.9
19	8,028	7,789	239	3.1	(-152)	87	1.1
20	8,030	7,815	215	2.8	(-141)	74	0.9
21	8,028	7,818	210	2.7	(-144)	66	0.8
22	8,029	7,859	170	2.2	(-139)	31	0.4
23	8,029	7,855	174	2.2	(-151)	23	0.3
24	8,029	7,803	216	2.8	(-154)	62	0.8
25	8,030	7,840	190	2.4	(-155)	35	0.4
26	8,027	7,831	196	2.5	(-163)	33	0.4
27	8,029	7,834	195	2.5	(-169)	26	0.3
28	8,029	7,797	232	3.0	(-167)	65	0.8
29	8,030	7,833	197	2.5	(-165)	32	0.4
30	8,029	7,846	183	2.3	(-162)	21	0.3
31	8,029	7,850	179	2.3	(-169)	10	0.1

Specific Gravity .588
Supercompressibility 1.0810 } Telemeter Settings

* Correction in Mcf. for error in manual specific gravity and supercompressibility settings
** Difference in Mcf. between telemetering and corrected billing

FIG. 2. **Telemetering comparison sheet,** May 1960, for intake from Tennessee Gas Pipeline Company.

TELEMETER COMPARISON
JUNE 1960

Date	Telemeter	Actual Billing Receival	Mcf. Difference	% Difference	Correction *	Difference **	% Difference
1	7,191	6,968	223	3.2	(-150)	73	1.0
2	6,912	6,663	249	3.7	(-140)	109	1.6
3	8,024	7,784	240	3.2	(-179)	61	0.8
4	8,010	7,776	234	3.3	(-186)	48	0.6
5	7,768	7,485	283	2.6	(-179)	104	1.4
6	8,027	7,770	257	3.0	(-174)	83	1.1
7	8,030	7,804	226	3.5	(-180)	46	0.6
8	8,030	7,849	181	4.3	(-211)	(-30)	(-0.4)
9	8,028	7,821	207	3.8	(-223)	(-16)	(-0.2)
10	8,027	7,789	238	3.3	(-219)	(-19)	(-0.2)
11	8,030	7,831	199	3.9	(-221)	(-22)	(-0.3)
12	8,026	7,801	225	3.5	(-226)	(-1)	-
13	8,026	7,775	251	3.2	(-219)	32	0.4
14	8,030	7,840	190	2.4	(-211)	(-21)	(-0.3)
15	8,026	7,807	219	2.8	(-222)	(-3)	-
16	8,030	7,783	247	3.2	(-234)	13	0.2
17	8,014	7,873	141	1.8	(-74)	67	0.9
18	7,900	7,811	89	1.1	(-65)	24	0.3
19	7,902	7,826	76	1.0	(-42)	34	0.4
20	7,900	7,771	129	1.7	(-41)	88	1.1
21	7,900	7,822	78	1.0	(-45)	33	-
22	7,900	7,844	56	0.7	(-47)	9	0.1
23	Billing Chart Lost						
24	7,898	7,887	11	0.1	(-6)	5	0.1
25	7,897	7,886	11	0.1	(-12)	(-1)	-
26	7,896	7,873	23	0.3	(-19)	4	0.1
27	7,901	7,867	34	0.4	(-12)	22	0.3
28	7,899	7,890	9	0.1	(-17)	(-8)	(-0.1)
29	7,906	7,887	19	0.2	(-16)	3	-
30	7,900	7,864	36	0.5	(-12)	24	0.3

Specific Gravity .588
Supercompressibility 6/1 to 6/16 1.0810
6/17 to 6/22 1.0600
6/23 to 6/30 1.0530
} Telemeter Settings

* Correction in Mcf. for error in manual specific gravity and supercompressibility settings
** Difference in Mcf. between telemetering and corrected billing

FIG. 3. **Telemetering comparison sheet,** June 1960, for intake from Tennessee Gas Pipeline Company.

of temperature or static or differential pressure to the computer. These are introduced through potentiometer settings similar to those permitting normal manual adjustment of specific gravity and supercompressibility inputs. Because experienced dispatching personnel can normally estimate any single variable from knowledge of associated measurements at the same and related points in the system, this provision permits reasonably accurate estimation of flow while defective components are being repaired.

Digital print-out of hourly gas intake totals at Tuxedo and Cedar Hill is provided automatically by two *Streeter-Ametron* tape printers. These units provide a permanent record of the integrated flow figures which are continuously indicated on the cyclometer dials of the computer-driven Bristol flow integrators.

Control decisions are based on the telemetered data signals generated at nine flow metering, 13 transmission line pressure measuring, and 17 distribution pressure checking locations. All measured variable signals are carried through conventional Bristol five-second impulse-duration telemeter circuits via the tone channels mentioned above.

These decisions are implemented by *Telepilot* control switches in the panels that provide the dispatcher with remote control over 11 flow control valves at strategic locations in the system. Through this system, he can regulate total intake from both pipelines, use of line pack, and level

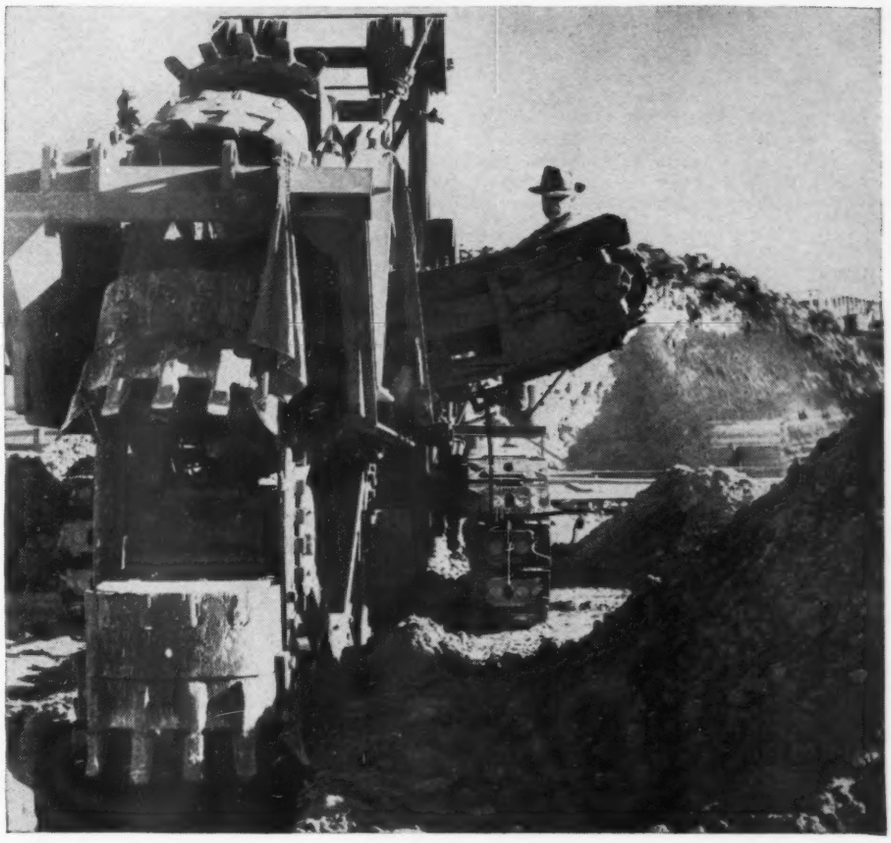
SAN DIEGO GAS & ELECTRIC MEETS BOOM WITH BUCKEYE DITCHERS

Naval installations, airfields, production of missiles and jetliners—San Diego is booming, and bringing plenty of work to the San Diego Gas & Electric Company. Example: in 1959 alone 28,788 new dwelling units were built, all needing new gas lines.

To handle one of its toughest jobs—digging trenches for the new gas lines—the utility operates a rugged team of 12 Gar Wood-Buckeye ditchers. These machines are matching the speed of modern construction methods, and operating with precision, ease, and economy.

Since their introduction, the Gar Wood-Buckeye 305, 307, and 308 utility ditchers have become recognized as the most modern on the market. One reason is hydraulics—all three models are equipped with a hydraulic wheel hoist and hydraulic conveyor drive. All three have main engine transmissions specially designed for ditcher use. All three have a split-shaft excavator drive for longer working life. And all three are operated by the simplest group of controls on any ditching machine.

For more than 60 years Gar Wood-Buckeye has been the choice of contractors, cities, and utility companies that want fast, precise ditching at the lowest possible cost.



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To meet fast production schedules through terrain as tough as San Diego's, the Gar Wood-Buckeye 305, 307, and 308 utility ditchers are more than just "ruggedly built." They are scientifically engineered to resist stress, to cut vibration to a minimum, and to deliver the greatest power to the digging wheel.

An all-welded panel truss frame supports the digging wheel and conveyor assembly of these machines—is exceptionally rigid and resistant to stress. The wheel itself is formed of two steel rings welded together for far greater strength. And the unique Buckeye digging buckets are of two-piece construction, for greater abrasion resistance and easier maintenance. Features like these are typical of Buckeye's extra measure of quality.

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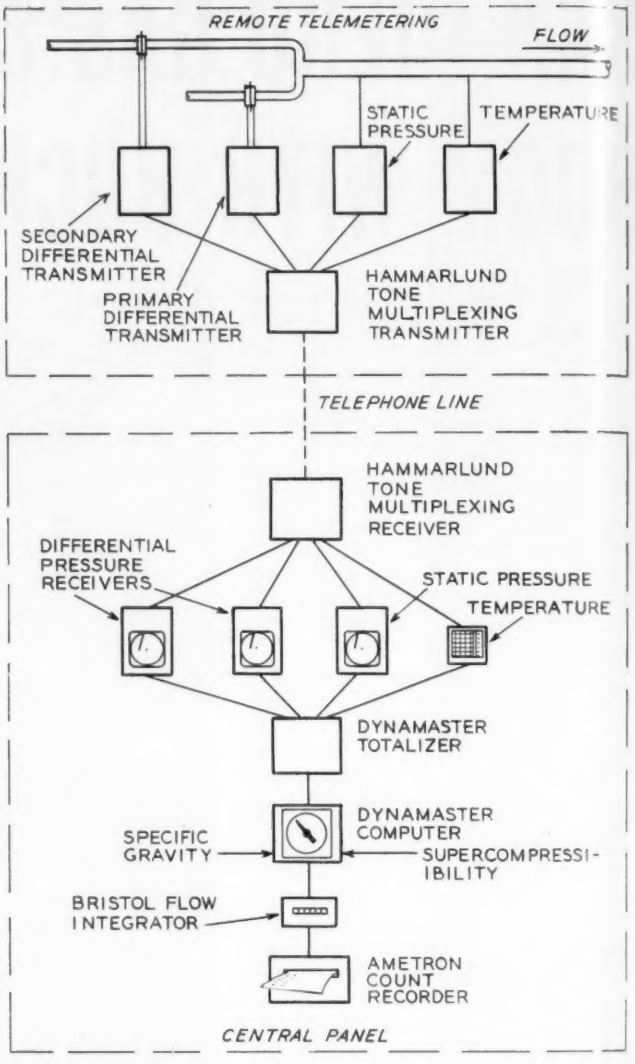

FIG. 4. **Block diagram** illustrates operation of Central Hudson's telemetering and computing system. All flow variables are telemetered via voice quality leased telephone lines from remote metering stations to receivers at central dispatch panel where differential and static pressures and flowing temperatures are recorded. Receivers, equipped with retransmitting slidewires, continuously feed measured values to the totalizer, which in turn retransmits an uncorrected flow analog to the computer. The computer corrects the totalized flow value for supercompressibility and specific gravity (these values are input manually through calibrated potentiometer settings). Computed flow rate, continuously recorded on the computer chart, is also fed to the integrator to provide an instantaneous record on its cyclometer dial. Integrator also actuates the tape printer, which records the total flow hourly.

of transmission and distribution line pressure from his central station. Control signals are multiplexed with the incoming data system in a two-way communications network for maximum economy in use of the leased telephone lines.

Accuracy Checking

In depending upon telemetered data to facilitate responsive flow control decisions, Central Hudson has instituted an intensive system of regular comparison of telemeter-computer flow values against actual billings. The comparisons shown in Figs. 2 and 3 are typical of those maintained daily for intake from each pipeline.

While the purpose of such checks is to detect computer or measuring system inaccuracies and to correct them before they can lead to costly dispatching errors, the corrections are not always performed on the instrumentation system. This point is best illustrated by reference to the Tennessee Gas Pipeline Company *Telemeter Comparison Sheets* for May and June 1960 (Figs. 2 and 3).

The comparisons show a consistent telemeter system error of about 200 Mcf through May and the early part of June. Because this was a steady and therefore predictable error, no attempt was made to adjust the equipment. Instead, a daily error was predicted and dispatcher decisions were based on the prediction. Because the inaccuracy introduced by manual settings of *supercompressibility* and *specific gravity* was gradually increasing, the equipment was finally readjusted and brought back to closer agreement with actual receivals on June 17, 1960.

Consider the results of scheduled receivals from Tennessee Gas Pipeline Company during that period:

Month	Scheduled Receival	Actual Billing Receival	% Difference
May 1960	241,800 Mcf	240,862 Mcf	0.388
June 1960	234,000 Mcf	232,500 Mcf	0.641

It is obvious from these figures that operating results were far more satisfactory than the telemeter comparisons would imply. Normally, of course, the manually set values of both specific gravity and supercompressibility would remain more nearly constant and would introduce smaller errors to the computer figures.

Summary of Results

Increasingly complex supply and demand problems created the need for Central Hudson's telemetering, computing, and control network. The benefits derived from the adoption of the network were threefold:

1) More economical dispatching through the provision of a continuous source of basic and computed data to permit faster response to changing demand loads and more accurate control decisions. These improvements mean improved use of gas from all sources with minimum danger of incurring overrun penalties.

2) Improved service through precise regulation of distribution pressure and through the early detection of abnormal conditions (i.e., leaks, abnormal loads, etc.)

3) Reduced operating cost through supervised automation of remote regulator stations.

The continuing degree of precision obtained in implementing its daily and long range scheduled receivals for most economical use of gas from two pipeline systems, from stored line pack, and from its own oil-gas production facilities has been due largely to the system's excellent maintenance program and to the closely related daily comparison of telemetered versus actual flow totals.

Reliability has also been facilitated by the high degree of cooperation extended by the New York Telephone Company in maintaining the system's extensive telemetering lines free from spurious interference or failure. ★ ★ ★

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Welders join two sections of plastic coated pipe on new gas distribution line as Bill Brand, left, co-owner and manager of the Circle Bar Ranch in the Stewart area of Arizona's Cochise County watches along with APS representative Jerry Broking. Line will deliver natural gas fuel for Brand's irrigation pumps.

Trencher, one of four machines used on job, cuts path across Cochise County for new distribution system to supply fuel for irrigation pumping.

Hydraulic Arm On Truck Speeds Pipe Laying

Herb Stokoe, Arizona Public Service Company, Phoenix, Arizona

After months of planning and weeks of concentrated construction effort, Arizona Public Service Company has completed a gas distribution system in the Stewart area of the state's Cochise County for the primary purpose of serving irrigation pumping engines.

Located in Southeastern Arizona, the Stewart area is one of the finest agricultural sections of the state. Only within the last few years have development of this land and economics of gas pumping made extension of gas feasible.

Stewart farmers were enthusiastic when approached by Public Service representatives. By the time engineering had been completed there was little time to finish construction before the spring growing season.

To offset this disadvantage the utility put a concentrated building program into motion. Approximately 43 miles of pipe was laid by mid-March. During one portion of construction, 43 men and four trenchers were busy in the area.

Steel pipe was used in the project with X-Tru-Coat polyethylene coating. The utility used 23,760 ft of 4-in., .156-in. wall thickness; 31,680 ft of 3-in., .188-in. wall; 55,440 ft of 2-in., .154-in. wall; and 114,230 ft of 1¼-in., .140-in. wall thickness. All joints were butt welded and tape wrapped.

A special truck-mounted, "swing boom" pipe-laying rig used was built to specifications established by two APS specialists. John McColm, automotive equipment specialist, and J. P. Watkins, manager of the company's Metropolitan Division gas operations, are credited with the design. According to McColm, they are planning further modifications to improve it.

The "arm" is a Holan 7500 series hydraulic derrick. It is adapted to a Holan service truck body modified to receive it. Work was performed by Holan to the utility's specifications.

The rig also includes conversion of a mechanical winch to hydraulic operation for ease in raising and lowering the pipe dolly.

The pneumatic tire pipe dolly is in widespread use by many utility companies. The one used by Public Service was built by the company. * * *

Coming . . . hydraulic "arm" mounted on truck positions pipe dolly to handle plastic coated pipe and lower it into trench . . .

Going . . . rear view illustrates how hydraulic arm and dolly work to ease pipe into trench. Special rig was designed by Arizona Public Service personnel, built by Holan.

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Distribution Developments

NEWS ABOUT CURRENT AND PLANNED CONSTRUCTION

Peoples Gas Light and Coke Company, Chicago, has work underway on the southern section of its new $20,000,000 interstation gas main. Work on this project was begun early as part of the mayor's program to increase employment in Chicago this spring. Over 500,000 man-hours will be required for the job, which will utilize 11 miles, or 4300 tons of steel pipe and extend from the utility's Calumet Station, located at 3200 East 98th Street, to 58th St. and Damen Ave. Work is currently underway at both ends of this $9,000,000 portion of the 36-in. line.

The route will be: west on 98th St. to Manistee Ave.; north to Anthony Ave.; northwest to 90th St.; west to Dorchester Ave.; north to 83rd St.; west to Michigan Ave.; north to 81st St.; west to Winchester Ave.; north to 77 St.; west to Damen Ave.; north to 74th St.; east to Winchester Ave.; and north to 58th St.

Last year Peoples Gas Light laid 8 miles of line from its North Shore Station to Chicago Ave. and Sacramento Blvd. Construction in 1962 will link the 1960 and 1961 segments. When completed, the new line will intersect medium pressure mains and will interconnect with distribution pumping stations.

Turning the first spadeful of earth to herald start of construction of the southern section of Peoples Gas Light's new $20,000,000 interstation gas main are Remick McDowell, left, chairman of the utility, and Chicago Mayor Richard J. Daley. Broken line on overlay map indicates route of the 11-mile section.

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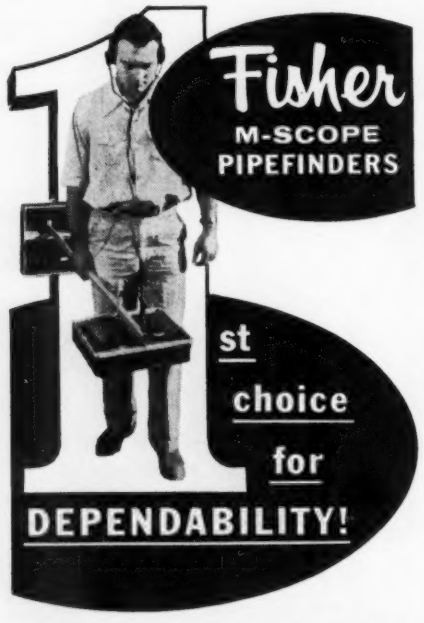
Distribution Developments

Iowa Power and Light Co., Des Moines, has construction underway on 15 new Iowa intermediate pressure distribution systems and conversion and expansion of Missouri Valley LP-gas system. Projects involve installation of 63,400 ft of ¾, 2, 3, 4 and 6-in. mains at an estimated cost of $173,000 in Dunlap, 62,600 ft of ¾ to 6-in. at cost of $180,000 in Logan, 20,400 ft of ¾, thru 3-in. at cost of $47,000 in Persia; 15,600 ft of ¾, thru 3-in. at cost of $42,000 in Portsmouth; 38,200 ft of ¾ thru 4-in. at cost of $93,000 in Neola; 17,600 ft of ¾ thru 3-in. at cost of $46,000 in Minden; 36,700 ft of ¾ thru 4-in. in Shelby at cost of $90,000. In Hancock, approximately 15,400 ft of ¾ thru 3-in. will be installed at a cost of $39,000; in Kimballton, 24,000 ft of ¾ thru 4-in. will be installed at cost of $60,300; in Marne, 18,500 ft of ¾ thru 3-in. will be installed at estimated cost of $43,000; in Elliott, 60,000 ft of ¾ thru 4-in. will cost approximately $127,000; in Treynor, 14,700 ft of ¾ thru 3-in., will cost $40,000; in Silver City, approximately 20,300 ft of ¾ thru 3-in. will be installed at cost of $47,000. In Mineola contractor crews will install 10,400 ft of ¾ thru 3-in. ($28,000), and in Macedonia, 16,800 ft of similar size line will be installed at a cost of $40,000. In Missouri Valley, approximately $166,000 has been tabbed to convert the LP-gas system and expand it by installation of 70,000 ft of ¾ thru 4-in. All work is scheduled to be completed by September 30.

Gas Light Company of Columbus, Georgia, has budgeted $279,000 for installation of new mains, services, and meters to serve 1400 customers. Another $60,000 is tabbed for routine replacement of mains and services, and general distribution system improvements. Projects involve installation of 100,000 ft of ¾-in., 6,000 ft of 1-in., 3,000 ft of 1¼, 1000 ft of 1½, 52,000 ft of 2-in., 12,000 ft of 4-in. and 12,000 ft of 6-in. Construction is underway by company crews and scheduled for completion by August 31, 1961. Also budgeted for this year is addition of four 30,000 gal propane storage tanks at an estimated cost of $60,000.

Citizens Gas and Coke Utility, Indianapolis, Indiana, plans to spend approximately $1,989,055 to install 410,050 ft of 2 to 16-in. distribution mains, 587,500 ft of 2-in. service lines, and 76,185 ft of 6 to 16-in. feeder mains. All work will be done by company crews within the Indianapolis area. Projects are to be completed within 1961.



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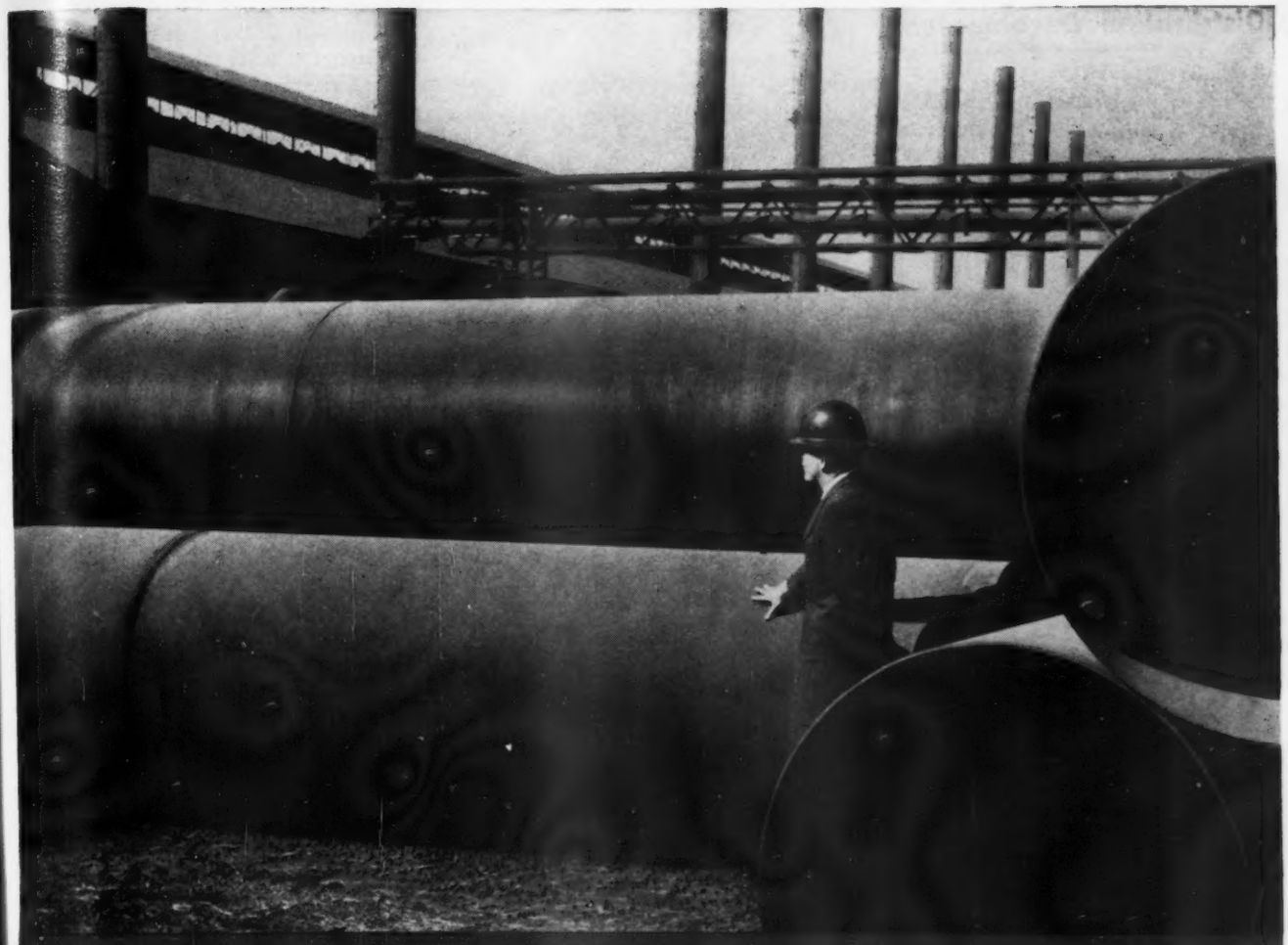

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Distribution Developments

Peoples Natural Gas Company, Pittsburgh, Pennsylvania, has allocated $11,805,000 for improvements and additions to its distribution systems in 1961. This includes expenditures of $3,395,000 in the Greater Pittsburgh area; $814,000 in Altoona; $856,500 in Glenshaw, Gibsonia, and Zelienople; $550,900 in Glassport; $628,800 in Aliquippa, $115,200 in Burgettstown, $444,000 in Greensburg; $139,600 in Indiana; $230,100 in Kittanning, $239,500 in Labrobe and Blairsville; $171,500 in Midland, $356,000 in Monessen and Point Marion, $314,900 in New Kingsington; $400,000 in Vandergrift, and $654,000 in Johnstown. Portions of the 1961 improvement program will also benefit areas such as Waynesburg, Monongahela, Carion, Apollo, and Ebensburg.

During 1960 Peoples spent approximately $11,765,000 for improvements and additions to its systems; installed 240 miles of mains and services, and added 9000 domestic gas heating customers. During 1961 company expects to install 225 miles of pipe, and add an estimated 8000 more customers.

Significant major projects completed during 1960 include: An improved Pittsburgh area medium pressure systems at an estimated cost of $30?,000; replacement of 2500 ft of main in Butler Street, Pittsburgh, at an estimated cost of $83,000; construction of 4 miles of 6-in. medium pressure line in the Loretto vicinity at a cost of $127,000 and construction of 3 miles of 6-in. line to the Alcoa Research Development Center in New Kensington, at a cost of $55,000.

Company replaced, at a cost of $350,000, approximately 7 miles of 12-in. line between Wilkinsburg and Valley Station to strengthen supply lines in Northern Division; replaced approximately 5 miles of 8 with 12-in. pipe in the Zelienople vicinity to accommodate growth requirements in that area at an estimated cost of $227,000; replaced approximately 4.75 miles of 8 with 12-in. in the Girty Station vicinity at a cost of $275,000 to improve system supply facilities and replaced 2 miles of 8 with 12-in. between Wall Station near Elizabeth and McKeesport, to improve storage facilities at an estimated cost of $166,000. Also company replaced, at a cost of $256,000, approximately 3.5 miles of 8 with 12-in. in the Bradford Woods vicinity.

New York State Electric and Gas Corporation, Binghamton, New York, recently completed new natural gas distribution system in the village of Morrisville, N. Y.

Ohio Fuel Gas Co., Columbus, has underway a $60,180 construction job to deliver more gas to Wooster Heights, Eastview, and Freedom Heights, northeast of Mansfield. New town border station will be constructed at intersection of Beal and Hulit Roads and more than 2 miles of new supply line–6, 8, and 10 inches—installed. New line extends south along Madison-Mifflin Township line to Bonham Drive and along Bonham to existing line at Crider Road-Route 42 intersection to deliver gas to Wooster Heights, Eastview and Freedom Heights. Wirt & Starn Inc. of Wooster is contractor. In another project, completed in February, O-F spent $33,600 to improve natural gas service in Amherst. New town border station of larger capacity was constructed along State Route 58 north of the Ohio Turnpike to replace present town border station at intersection of State Route 58 and Park Aven. Present building will be converted for use as a regulator station. Burkhardt Construction was contractor.

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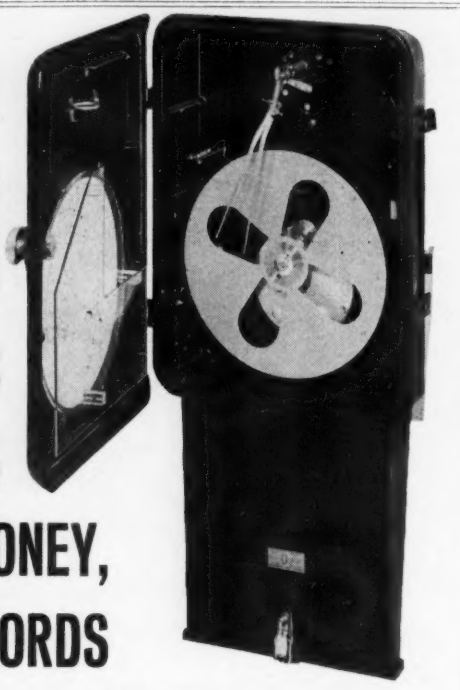

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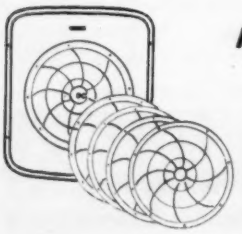

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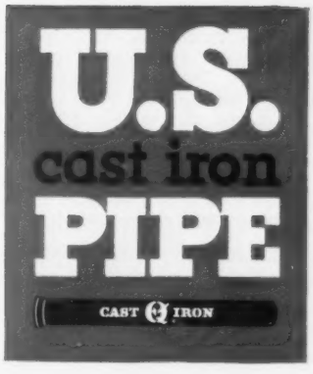

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"This Model 774 took charge after two ditchers, backhoe and dynamite had failed," reports William Hogan, vice president of GTR Const. Co., Inc., Tucson

William Hogan, of GTR Construction Co. recalls these conditions existing:

"We were trying to trench through a nightmarish 15,000′ stretch of caliche rock the consistency of cement. A ¾ yd. backhoe with ripper bucket couldn't chew through this rock. We tried shortening the boom on a ladder type ditcher for more rigidity, but it literally shook itself apart. Then we tried digging partial depth with a wheel ditcher and it flopped. Last resort was dynamite. It cost too much and we couldn't use it in urban zones.

"Finally, we got a Barber-Greene 774. It thrived on a steady diet of caliche, excavating boulders up to basketball size. And where the backhoe had ridden up over the rock, this 774 gave us full trench depth.

"To date, our 774 has trenched over 50,000′, 24″ wide and to 80″ deep. Virtually all footage has been in stretches so tough our competitors wouldn't even think of tackling it with their ditchers," he relates.

What's the big difference in ditchers? Operator Don Crockett credits: 1) exclusive dual-range Hydra-Crowd transmission "that lets me consistently operate at maximum capacity for any given ground condition"; and 2) special floating wheel mounting that absorbs continual digging shocks without transmitting them to the rest of the machine.

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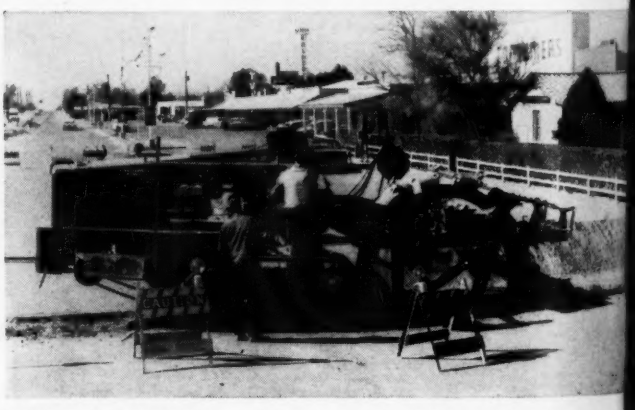
Get the full story on the only modern utility ditcher line from your Barber-Greene distributor. He can show you how to get more trench per day, more trench per dollar, in all digging conditions.



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Distribution Developments

Illinois Power Company, Decatur, Illinois, plans to install a distribution system in the village of Wyanet, Bureau County, Ill. Approximately 2.4 miles of 2-in. supply lateral will tap Natural Gas Pipeline Co. of America's transmission system. Work will get underway pending FPC approval of CP61-229. Company has Illinois Commerce Commission permission to install and operate another distribution system in Prairie du Rocher, Randolph County, Ill., and recently asked the FPC to direct Mississippi River Fuel Corp. to connect and serve the system. Estimated to cost a total of $146,238, the new distribution system involves installation of 10,448 ft of 2-in. feeder main at cost of $18,065, and a $4000 regulator station; 21,481 ft of 1¼-in. mains at a cost of $32,916 and 1550 ft of 3-in. at cost of $3860.

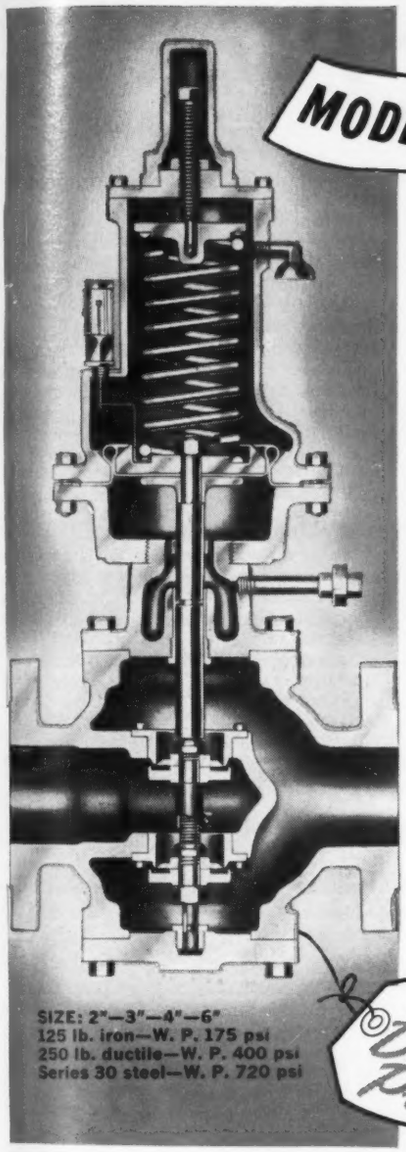
Iowa-Illinois Gas and Electric Company, Davenport, Illinois, plans to install a 15-mile 10-in. feeder line from the main transmission line of Natural Gas Pipeline Co. of America near Orion, Illinois, to the Riverside Generating Station. New line will cross the Mississippi River and tie in with the existing feeder line near Riverside providing another source of supply to the Davenport and Bettendorf area. Estimated cost is $568,000. In another project, company plans to extend gas distribution systems to North Liberty in Iowa City district and to the communities of Fremont, Cedar and Wright in Ottumwa district. Also the following Illinois towns will be added: Andalusia, Coyne Center, Orion, Coal Valley, Port Byron, Rapids City and adjacent area. Company has recently completed distribution systems in West Liberty and Wilton, Iowa, at an estimated cost of $1,100,000 for a feeder line and distribution systems; and to Atalissa, Iowa (close to West Liberty) at a cost of approximately $44,000.

"I'M AFRAID WE'LL HAVE TO DISTURB YOUR DAISIES."

CHAPLIN-FULTON

MODELS

441 461-57S Gas Regulator

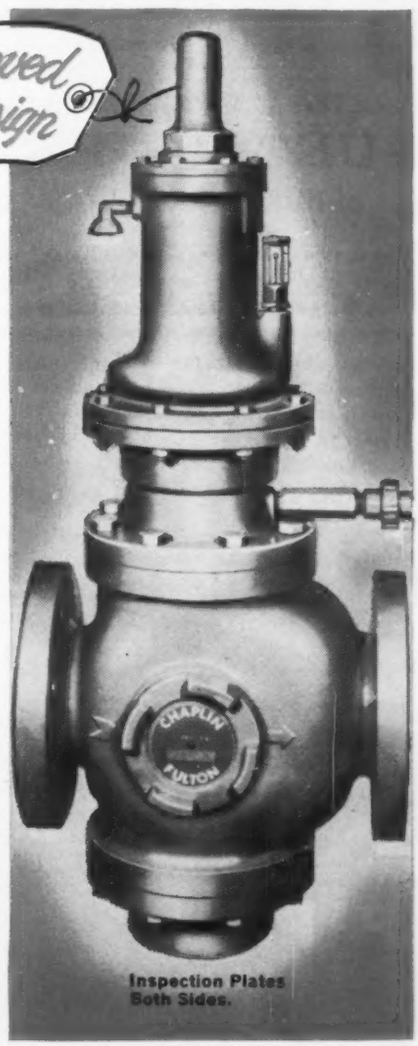


SIZE: 2"—3"—4"—6"
125 lb. iron—W. P. 175 psi
250 lb. ductile—W. P. 400 psi
Series 30 steel—W. P. 720 psi

Advanced Diaphragm Principle

Model 57-S, for pounds-to-pounds service, operates on a new principle which maintains accurate control throughout full valve travel. The *patented* diaphragm action compensates for the "fall-off" in conventional spring regulators, which greatly limits their capacity to allowable droop. You can reduce costs greatly by installing a 57-S, one or even two sizes smaller than previously, to deliver the same volume. Usable Capacity = 100% of potential capacity. Controlled pressures—3 to 75 psi—with *one* assembly.

Improved Body Design



Inspection Plates Both Sides.

Also, new improved body design—either 441 or 461—with enlarged flow areas and standard face-to-face dimensions for easy replacement. Available in iron, nodular ductile or electric steel. And an extra value—inspection plates on *both* sides, O-ring sealed —for quick removal and ready inspection. A valve travel indicator to check position and estimate flow, pressure and water tight.

New principle—new design—new versatility—greater economy.

ACCURATE CP MFG CO DEPENDABLE

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61-571

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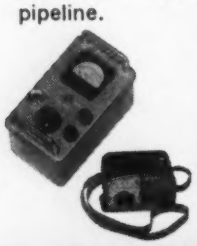

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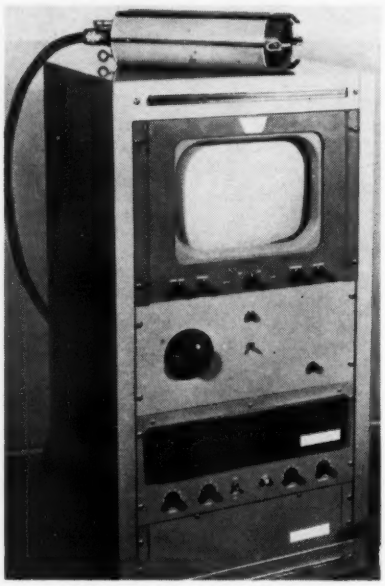

Television system for inspection of gas lines — the first mass produced — is now being marketed by Inspectoline Inc. Water tight, the system is complete with enclosed lighting system, 500 or 1100 ft of cable, and a generator. Is capable of being pulled through gas mains as small as 4-in. in diameter and as large as 48-in. in diameter. **1**

High speed alarm scanner capable of scanning up to 200 measured variables at the rate of one point per second has been developed by Bristol Company. On discovery of any "off-normal" situation, instrument activates a recorder which records alarm condition measurement and report its exact location, actuates a red alarm lamp and energizes any desired external alarm system. Upon completion of these functions, instrument returns to normal scanning — leaving the alarm lamp "on" until reset. **2**

Infra-red plumbers furnace . . . revolutionary method of melting lead using infrared heat . . . uses low pressure natural gas or propane cyclinder. Operates on one-quarter of the fuel used by conventional furnaces. Infra-Red furnace uses average of 12,000 Btu per hour; conventional furnaces use average of 48,000 Btu per hour. New furnace comes complete with 8-in. cast iron melting pot that will hold approximately 50 lb of lead, 6 ft of ¼-in. hose, gas control valve and pressure regulator. Orifice for use with natural gas is also supplied with each furnace. **3**

Instrument pens . . . and automatic inking systems for recording instruments are described in new 4-page bulletin. A universal pen nib and two basic ink-feed systems are described. One type of ink-feed system, the bladder pen, is said to represent new concept in instrument inking. Pen is free from "flooding" and failure, and one with which fast drying inks may be used to overcome gas measurement chart blotting requirements. **4**

Natural gas carburetor . . . said to be first "low cost" carburetor to efficiently handle natural gas because no secondary regulators or other devices are required and elaborate plumbing systems have been eliminated . . . is available from Imperial Machine Products Co. Designed specifically for engines operating on natural gas, manufactured gas, or LP-Gas as a standby fuel, this carburetor operates directly from an ounce regulator on natural gas with no final stage of regulation or from an atmospheric regulator on LP-Gas. Available in sizes ¾ in. thru 1¾ in. for either updraft or downdraft installations. **5**

Computer report from Bendix describes solution to "profit squeeze." The 8-page report describes how advanced mathematical techniques and the Bendix G-20 high speed computing system can be used to reduce overhead costs, excess inventories, and production waste for manufacturing concerns. Also describes how G-20 uses multiple regression analysis and linear programming to provide management with timely data for improved control and decision making. **6**

Automatic chart changer . . . the Automatic Meterman . . . . is described in new 4-page bulletin as a method for utilizing as many as 40 circular gas measurement charts in a single recorder without need for manual chart changing. Device disengages charts, one by one, at pre-selected times, and allows them to drop into a storage box attached below recorder. Charts on any number of recording units can be changed simultaneously. **7**

Do-It-Yourself fuel cell demonstration kit . . . is now available for instructional and educational purposes . . . from Allis Chalmers, pioneer in fuel cell research and whose experimental fuel cell powered tractor was first demonstrated in October 1959. The kit uses basic fuel cell principle. Alcohol is the fuel; hydrogen peroxide the oxidant. Electrolyte is potassium or sodium hydroxide; catalysts are platinum for fuel and silver for oxidant. Fuel cell in kit will produce electricity sufficient to operate a 1½ volt motor for about 15 minutes on one fueling. Full teaching information is included. Kit sells for about $10. Write for details. **8**

Electric generating plants. Catalog sheet lists entire line of Onan electric generating plants, — both gasoline and diesel-driven — from the smallest 500 watt unit to the largest emergency diesel set of 230,000 watts. Typical units in each size range are pictured and a brief description of the outstanding features of each series is given. **9**

Continuous gas sampler for accurate determination of chemical and physical properties of a gas, developed by Arco Instrument Co., is now supplied with gas drive and pressure recorder. Is available for sample ranges from 30 to 300 psig. Bulletin describes how instrument will, over a period of 7 days, accumulate at a constant rate a sample of gas to a final pressure at or near 300 psig from the sample source the minimum pressure of which is not less than 340 psig. Gas sample is gathered in portable container for easy access to laboratory. Sampler can be employed in any hazardous area where vapor proof equipment is required because it needs no external source of power. **10**

Remote reading of meters and other applications involving a new concept of pulse information data transmission are described in 4-page brochure from Guardian Electric. Design and installation of the system for remote meter reading in a public utility gas company where daily readings of large commercial consumers are required is described and a simplified block diagram outlines the sequence and type of equipment used. System has application wherever accumulated pulse data can be most advantageously used when transmitted on a remote reading basis for central office monitoring, recording, and accounting. Can be used with telephone company central office facilities or with presently installed, privately owned, transmission lines, routed independently through a private switchboard, or by direct wires to a central monitor. **11**

Flexible compression couplings and adapters . . . 4-page bulletin describes Adams no-thread fittings for quick, easy low-cost joining and repair of small diameter pipe lines. Couplings and adapters have all malleable iron bodies and nuts, with largest gaskets and heaviest construction of any comparable products. Price list and specification are included in bulletin. **12**

Portable gas-fired infra-red burner for research and testing of low-temperature industrial infra-red process applications is now available from Bryant Industrial Products Corp. A self-contained supply of propane gas from a replaceable tank supplies unit continuously for two hours. Completely portable weighs only 12 lb, burner has built-in carrying handle that doubles as foot support for bench use. Burner operates at any angle. Face temperature can be varied from 1200 to 1800 F. Nominal heat output is 10,000 Btu per hour. Unit can be used for comparison of infra-red heating methods. **13**

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Specializing in Underground Natural Gas Storage
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LU 4-1913, LU 4-7753
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Tulsa 3, Oklahoma

New 4-in. pipe size gas pressure regulator from Maxitrol Co. is designed for rugged industrial low pressure gas service where pressure drop must be held to absolute minimum. Regulator has cast iron and steel case construction and can tolerate rough usage. Generous design of internal parts gives conservative maximum 5 psi operating pressure with no structural damage at 25 psi emergency exposure. **14**

Bead tipped gasket . . . from Norton McMurray . . . now offers further improved bonding efficiency by exposing maximum area of the beads. Under compression hardened brass beads bite into both pipe and fitting resulting in a joint of low resistance. Gaskets require no burnishing. **15**

Proper Gas Venting . . . third technical bulletin . . . issued by the Gas Vent Institute, is available to all who are interested in venting problems. The 4-page bulletin describes corrosion-resistance properties of double-wall gas vents and is intended to correct any misconceptions that exist on abilities of double-wall gas vents to withstand corrosion. New bulletin supplements Bulletin 1, which outlines simplified theory of venting and the principles of double-wall gas vent operation, and Bulletin 2 which covered advantages to be gained by use of Type B double-wall metal vents in place of Type C single-wall pipe for vent connectors. **16**

Alimony has been defined as the high cost of leaving.

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VALVE COVERS
Engineered to prevent most common valve problems. Oversize stud provides friction-free contact with index drive flag. Micro-finish lapped surface assures perfect seal. Extra heavy valve shell covers top and sides of carbon-graphite ring for full protection.
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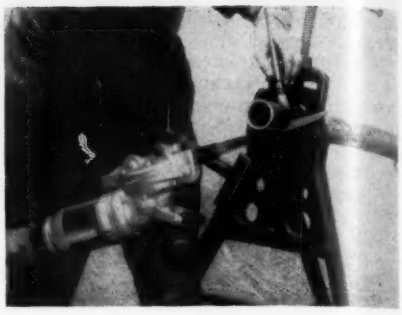
PRODUCT



Portable hacksaw for pipe . . . of particular value in limited and inaccessible spaces . . . cuts any steel or cast iron pipe up to 12-in. OD. Saw blade moves at speed of 480 strokes per min with 2½ thrust; is guided by rollers moving on ball bearings. Saw can be electrically or pneumatically powered to fit your requirements. A clamping device for securing the saw to the material-being-cut avoids jamming and breakage of saw blade and insure perfectly straight, even cut at angles up to 45 deg. **17**

Lube oil booklet. 6th edition of "Lubricating Oils for Industrial and Heavy-duty Automotive Engines" is now available from the Internal Combustion Engine Institute. Pocket-sized, the 75-page booklet lists approximately 750 oil companies and their brands of oils each guaranteed to meet test requirements of U. S. military specification MIL-L-2104A as well as Supplement 1 (S-1) and Series 3 (Caterpillar) test specifications. Individual copies of booklet are available at 35 cents per copy. **18**

New truck cab . . . designed for utilities . . . seats four comfortably. Steering column and controls are all located at extreme left of cab for easy handling. Heavy, three piece, metal bumper guard protects headlamp assembly, cab front, and radiator. Cab exterior width is 88 in. Driver's seat is fully adjustable with movement allowed in 3 directions. Shelf to rear of seats allows room for radio and other special equipment that might be required in regular or emergency work. **19**

Engineers, designers, and pipe buyers will be interested in new brochure from Tubular Products Div. of Babcock & Wilcox Co. dealing with light wall gas distribution welding fittings manufactured from seamless steel tubing to ASTM specification A-234 and materials specification ASTM A-106, Grade B. The 6-page booklet contains dimensional charts on light wall pipe, ells, returns, tees, caps, reducers, and slip on flanges. **20**

Meter stop for positive control of home service turnons is newest addition to Mueller Co.'s popular line of LubOseal meter stops. Called the Innerlock, the new stop is so constructed that a customer can quickly and easily turn the gas off with most common household tools, but once the stop is off, the customer must call the gas company to turn it on. A special wrench available only to gas companies restores service quickly and easily and automatically resets stop and makes it ready for future shut-off use. Rated up to 125 psi, the new stop is available in ¾-in. pipe size. **21**

PARADE

Fitting reference book . . . a practical handbook for all who specify, design, or use piping systems . . . provides wealth of valuable information on fittings thru 42-in. size. The 32-page catalog includes ells, branches, flanges and specials, extruded headers, venturi reducers, wrap-around saddles, scraper bar tees and other fittings. Availability of each type of fitting in carbon steel, high yield strength, and all other metals is shown, and booklet also gives detailed working pressure ratings for each size and wall thicknesses, based on ASA Code B31.8, and B31.4. **22**

Compactor. New model "Rapak" self-propelled, one-man earth compactor manufactured by Racine Hydraulics & Machinery, Inc., works narrower and deeper areas, now makes it possible to tamp ditches as little as 4-in. wide and up to 40-inches in depth. Has a one-shot lubrication system built into head of machine as an integral part. Unit achieves longer engine life thru new sleeved, 4-cycle engine, and heavy duty centrifugal clutch. Delivers 450 heavy ram blows per minute and is designed to compact all types of granular as well as cohesive soils. **23**

Trencher-backfiller . . . with high flotation and maximum traction . . . lets operators work in adverse soil and weather conditions. Crawler-type trencher creates only 3.6 lb ground pressure per sq in., less than the average man does, so compact unit can operate in soft or wet terrain. Large, self-cleaning track shoes don't tear out sod when working in landscaped yards. Unit is designed so its 1400 lb weight is distributed and balanced to obtain excellent traction. Integral backfill blade allows unit to complete job by backfilling trench once pipe is in place. Digging range is 4 in. wide to 66 in. deep, to 12 in. wide and 66 in. deep. **24**

Four pressure regulators . . . designed for reducing, relief, and back pressure applications . . . are described in new bulletin from American Meter Co. Available with maximum inlet pressures to 200 psi and maximum outlet pressures to 350 psi, regulators are available in full range of sizes from ¾ to 2-in. Suitable for wide variety of applications, including first and second stage regulation for farm taps. Complete specifications are provided, including tables for reducing capacities, pressure spring recommendations, valve orifice recommendations, and relief capacities. **25**

Utility tractor equipment — wheel and crawler types — are described fully in new illustrated three-fold specification sheet from Allis-Chalmers Manufacturing Co. Each model utility tractor is pictured with the attachments engineered to it. **26**

Do you read for profit? Ever wonder how you can possibly cope with the giant reading load posed by an ever-growing number of technical articles being published today in trade and business publications? To help you develop efficient reading habits so you can extract the maximum personal profit from this growing volume of material being printed, write for the easy-reading "how-to" booklet, "Why, When and How to Read Business Publications," offered free by Fred Wittner Co. Could be "the most important do-it-yourself booklet you ever read." **27**

Complete family of bitumastic primers and enamels for pipe protection is described in new illustrated bulletin from Tar Products Div. of Koppers Co. Bulletin is divided into 3 sections, also includes color-coded enamel selector as aid in selecting correct protective coating system for specific ranges of field conditions. First section describes facts behind protective properties of coal-tar base bitumastic enamels and illustrates their use in a number of typical applications. Bitumastic primers and enamels are covered in remaining two sections. **28**

The cute little blond talking to the wealthy Texan . . . "How much did you say your name was?"

Color coding simplifies adjustment and servicing of Harper-Wyman oven thermostats. By pass adjustment screws will be colored red and pilot adjustment screws will be green. Details available in new literature piece. **29**

Features of compact cathodic protection rectifiers for gas distribution networks are described in 2-color spec sheet from Lester Equipment Manufacturing Co. Two models are available — a 20-v. d-c, 9-amp capacity model with up to 25 voltage selections using tap switches, and a 10-v. d-c, 8-amp model with a continuously variable auto-transformer. Rectifiers are convection air cooled, utilize class B transformer for longer life, require 115-v., 60 cycle, single phase input. Outer housing is removable. **30**

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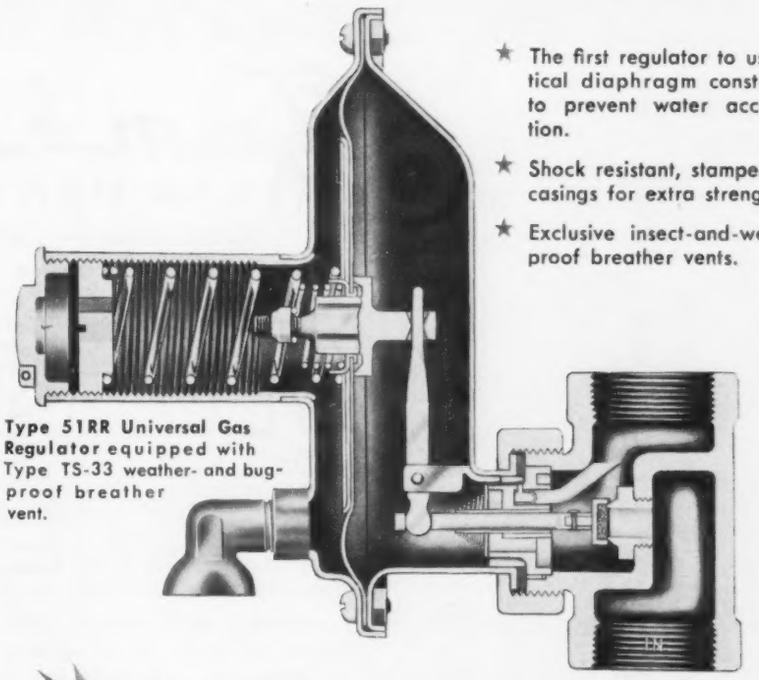
Thorough reliability — one of the many advantages of UNIVERSAL Gas Regulators — is fully assured by a complete factory testing program. Along with checks for material and workmanship quality, testing includes actual performance — not of randomly selected samples — but of each and every Regulator. This assures reliability you can count on, and accounts in a large measure for the ever-growing number of UNIVERSAL Regulators in service. Evaluate the advantages they offer you.



Type 51RR Universal Gas Regulator equipped with Type TS-33 weather- and bug-proof breather vent.

★ The first regulator to use vertical diaphragm construction to prevent water accumulation.

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★ Exclusive insect-and-weather-proof breather vents.

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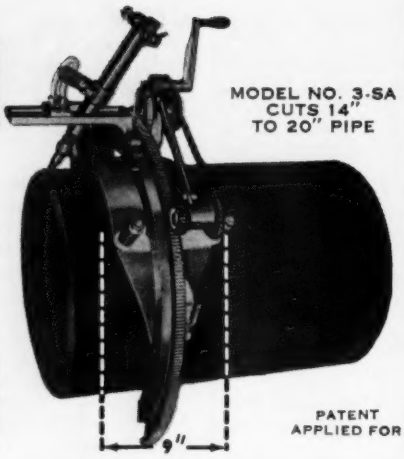

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With the Clements Cadillac model K3 or M2 you can bring the torch to the work instead of the work to the torch as in fixed installations. Furnished fully equipped with 20 ft. of Underwriters' Laboratories and Canadian Standards Association approved 3-wire cable with plug, 10 ft. of gas hose with fittings ready to attach to your gas line and with sturdy, high stability stand. Easily adjustable for height and direction of torch.

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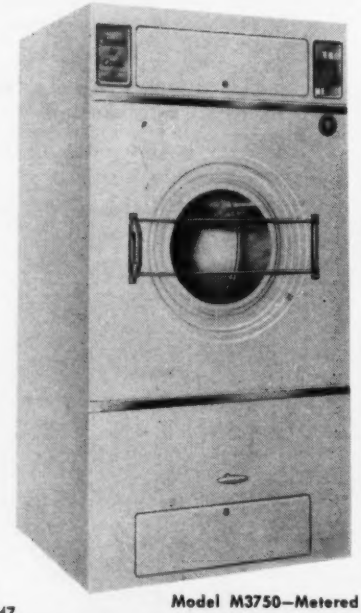

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6047

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Here is an outstanding gas appliance — built to a new high standard that sets the pace for the entire industry. Ideal for coin-operated laundry stores, attended laundries, "on the premise" installations; an opportunity for the gas man to render another fine service.

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